Oil and Gas Assessment Project

Phase II – Report Number 5

County of Los Angeles

September 2021

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County of Los Angeles

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Los Angeles Oil and Gas Strike Team

Bi-Annual Report Number Ten

FINAL REPORT

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Executive Summary

On March 29, 2016, the Los Angeles County Board of Supervisors (Board) passed a motion instructing the Director of Regional Planning, in coordination with the Fire Chief, Interim Director of the Department of Public Health, and Director of the Department of Public Works, to convene a Strike Team to assess the conditions, regulatory compliance and potential public health and safety risk associated with existing oil and gas facilities in unincorporated Los Angeles County (unincorporated County), excluding that area of the Inglewood Oil Field that is regulated under the Baldwin Hills Community Standards District. The Board instructed the Strike Team to report back on a biannual basis with a summary of its findings and any recommendations on legislative and regulatory positions that the Board should consider.

Phase I of the project was completed in September 2017 and provided an assessment of oil and gas facilities in unincorporated Los Angeles County with the following tasks:

- Verifying and updating an existing inventory of oil and gas facilities;
- Conducting site visits and compliance review of the oil and gas facilities;
- Developing a public health assessment screening tool; and,
- Researching the regulatory frameworks of other jurisdictions with similar oil and gas infrastructure.

The results of the Phase I efforts are detailed in biannual reports dated October 2016, March 2017, and September 2017 and concluded that additional investigation into oil and gas facilities was warranted.

On September 4, 2018, the Board approved contractual consulting services to continue the efforts of the Strike Team related to oil and gas facilities. This report is the fifth and final biannual report to be provided to the Board during the current 36-month long Strike Team Phase II effort. Under Phase II the Strike Team is tasked with researching and investigating the following oil and gas elements:

- Abandoned and orphan wells;
- Storage facilities;
- Pipelines; and,
- Hazardous chemicals.

This report provides additional data obtained to date and presents prioritization screening for a large number of wells, pipelines, chemicals, and facilities reviewed under this analysis. This final report also summarizes the collection and analysis of the data and presents recommendations for public safety and environmental improvements to the regulation and operation of the facilities analyzed in this Project. This final report concludes and closes the Strike Team effort pursuant to the Board motions on March 29, 2016 and September 4, 2018. Recommendations are summarized in Table ES.1 and Section 1.3 and detailed in the applicable sections of the Strike Team reports.

Table ES.1 Summary of Strike Team Recommendations

Strike Team Report	Recommendation
Oil and Gas Well Inventory	• Zoning study of oil and gas regulations
Phase I Oil and Gas Facility Compliance Review Existing Active Wells	• Update the County Zoning Code • Evaluate additional oil and gas facilities • Review of other oil and gas industrial uses • Interview community members • Review environmental review procedures
Phase II Oil and Gas Assessment Project	• Adopt procedures for DRP staff review of oil and gas projects • Adopt requirements for applicants of oil and gas projects • Adopt development standards for oil and gas projects; • High priority well monitoring • Provide additional review of idle wells in coordination with other agencies • County access to Pipeline operator records • Adopt Requirements for pipeline installation and use • Adopt Requirements for the inspection, monitoring, testing and maintenance of pipelines • Require a Hazardous Materials Business Plan and AQMD 1148.2 databases Review for toxic and explosive materials • Require a Transportation Risk Management and Prevention Program (TRMPP)

1.0 Background

This is the tenth report to update the Board on the Strike Team's efforts. The two board actions are summarized below. Consistent with the Phase I reports, the Phase II reports are cumulative in the analysis: the findings of each Phase II report are incorporated into forthcoming reports as information is collected and the analysis updated.

1.1 Board Motion Regarding Proactive Planning and Enforcement of Oil and Gas Facilities Operating in Unincorporated Los Angeles County

On March 29, 2016, the Los Angeles County Board of Supervisors passed a motion to:

- Convene a Strike Team consisting of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief to assess and report on a biannual basis the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los Angeles County;
- Review Los Angeles County Title 22: Zoning Code to ensure that oil and gas facilities may no longer operate by right in the unincorporated portion of the County and to ensure that regulations reflect best practices and current mitigation measures and technologies, minimize environmental impacts and protect sensitive uses and populations;
- Coordinate with cities throughout the County that are interested in collaborating on the development of regulatory requirements and protocols for monitoring and evaluating their local oil and gas facilities;
- Create an Advisory Panel consisting of independent experts in oil and gas exploration and production as appointed by the Board of Supervisors to assess the biannual reports of the Strike Team; and,
- Ensure that County Planning and Code Enforcement services are not negatively impacted.

1.2 Board Action Regarding Continued Strike Team Efforts Regarding Oil and Gas Facilities Operating in Unincorporated Los Angeles County (Phase II)

The results of the work completed under Phase I concluded that additional investigation was merited related to oil and gas facilities in the unincorporated County. Therefore, on September 4, 2018, the Los Angeles County Board of Supervisors approved contractual consulting services to continue assisting the efforts of the Strike Team on oil and gas facilities with focus on the following tasks:

- Continue the work of the Strike Team consisting of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief to assess and report on a biannual basis the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los Angeles County for the following:
    - Identify, assess, and prioritize orphaned and abandoned oil and gas wells in the unincorporated County;

- Identify, assess, and inventory oil and gas pipelines within oil and gas fields, common carrier pipelines outside of oil fields and utility pipelines within the unincorporated County;
- Identify and assess oil and gas storage facilities in the unincorporated County; and,
- Review chemicals at oil and gas facilities not identified in Hazardous Materials Business Plans.

- Continue the coordination and corroboration with the Advisory Panel consisting of independent experts in oil and gas exploration and production as appointed by the Board of Supervisors to assess and to provide written comments on the biannual reports.

1.3 Previous Reports

1.3.1 Los Angeles County Oil and Gas Well Inventory

On July 28, 2015, the Board directed the Department of Regional Planning (DRP), in consultation with the Department of Public Health (DPH), to develop a detailed inventory of all oil fields and the associated level of environmental monitoring of all oil wells currently operating within the unincorporated areas of the County of Los Angeles. MRS Environmental, a consulting firm with expertise in the oil and gas industry, along with County DRP Staff prepared the Los Angeles County Oil and Gas Well Inventory report dated December 2015. The Oil and Gas Well Inventory report identifies facility and well locations and includes a review of local, State, and Federal regulatory requirements for the drilling and operating of oil and gas wells. The report is available on the County Department of Regional Planning web site (http://planning.lacounty.gov/oil-gas/well).

1.3.1.1 Recommendations

Based on the findings of the Oil and Gas Well Inventory Report, the Strike Team staff recommended that the DRP conduct a zoning study to review oil and gas well regulations against current regulatory standards to protect the health, safety, and welfare of surrounding communities. Further, the recommendation directed DRP to determine if updated standard conditions and/or amendments to Title 22 are needed; and evaluate the appropriateness of "by-right" use of oil and gas wells within Title 22.

1.3.2 Los Angeles County Oil and Gas Compliance Reports (Phase I)

As noted above, the Oil and Gas Facility Compliance Review Project reports completed under the Strike Team Phase I efforts were submitted to the Board in October 2016, March 2017, and September 2017. The reports included inspection checklists, a well inspection protocol, results from facility inspections and a screening public health assessment for 12 facilities and 557 oil and gas wells. The report also included review and recommendations for further review on legislative positions, regulatory positions, legal positions, and other facilities that may benefit the County by undergoing a similar review. The report is available on the County Department of Regional Planning web site (http://planning.lacounty.gov/oil-gas/strike).

1.3.2.1 Recommendations

The Phase I Strike Team reports concluded with the following recommendations:

- Update the County Zoning Code for oil and gas operations;
- Oil and gas facilities in nearby jurisdictions outside the County be evaluated;
- Review of other industrial uses related to the oil and gas industry;
- Interview community members in neighborhoods near oil and gas operations; and,
- Review environmental review procedures to identify improvements for the permitting of oil and gas projects and inter-departmental and inter-agency coordination on same.

1.3.3 Los Angeles County Oil and Gas Compliance Reports (Phase II)

The initial Phase II Oil and Gas Facility Compliance Review Project report was submitted to the Board in March 2019 with subsequent reports completed in September 2019, June 2020, and March 2021. Note that the June 2020 report was delayed from March 2020 and an additional report scheduled for September 2020 was not completed due to the COVID-19 pandemic. The research, database development, and mapping in the first four reports provided the Strike Team Phase II data on the issue areas and provided staff with applicable tools to continue forward with the Project as reflected in this fifth and final report. The reports are available on the County Department of Regional Planning web site (http://planning.lacounty.gov/oil-gas/strike). Input from the Strike Team Advisory Panel on the previous reports are summarized in Appendix A.

1.3.3.1 Recommendations

The Phase II Strike Team reports recommendations are detailed in this report and summarized below:

- Adopt a list of recommended procedures for DRP staff review of oil and gas projects;
- Adopt a list of recommended requirements for applicants of oil and gas projects;
- Adopt a list of recommended development standards for oil and gas projects;
- Recommendation that high priority well monitoring continue and be expanded to additional wells in the County;
- Further review of idle wells in coordination with other agencies;
- Recommendation that pipeline operators provide copies of the State Fire Marshall Pipeline Annual Reports to the County for review;
- Adopt a list of recommended requirements for pipeline installation and use;
- Adopt a list of recommended requirements for the inspection, monitoring, testing and maintenance of pipelines;
- Coordinate with the Fire Department and the Hazardous Materials Business Plan and AQMD 1148.2 database to better understand the use and quantities of certain chemicals; and,
- Recommendation that a Transportation Risk Management and Prevention Program (TRMPP) be required for the temporary use of chemicals in well drilling and well completion activities.

1.4 Phase II Project Scope

As listed in Section 1.2 above, the Phase II scope includes review and assessment of orphaned and abandoned wells, oil and gas pipelines, oil and gas storage facilities, and chemicals not identified in Hazardous Materials Business Plans. Tasks also include a review of regulatory agency databases and permits, site visits, evaluation and prioritization of public health and safety risk, and recommendations for further action. The scope does not include a review of down-hole compliance issues (well testing and conditions of well bores below the surface of the ground) or ambient air monitoring such as the installation of toxic air pollutant monitoring stations.

1.5 County Departments and Their Roles

County Departments involved in the Strike Team include the following:

- Regional Planning;
- Public Health;
- Public Works;
- Fire; and
- County Counsel.

The role of each of these is discussed below.

1.5.1 Department of Regional Planning (DRP)

The DRP is the lead County agency for this compliance review effort. DRP is responsible for the following components and tasks:

- The Director or her designee to attend Strike Team public meetings;
- Project management;
- Hire and manage the consultant assisting the County;
- Coordinate and facilitate staff meetings;
- Coordinate and staff Advisory Panel and Strike Team meetings;
- Research and collection of regulatory mapping, infrastructure, and inspection data;
- Coordinate information exchange between all involved agencies;
- Develop an unincorporated County orphan and abandoned well database;
- Develop an unincorporated County pipeline database;
- Develop an unincorporated County chemical database;
- Attend the field site visits;
- Prepare field site findings; and
- Prepare biannual reports.

1.5.2 Department of Public Health (DPH)

The DPH's role on the Strike Team includes:

- The Director or her designee to attend Strike Team public meetings;
- Research and collection of DPH issues, complaints, and enforcement actions;
- Attend staff meetings;

- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.3 Department of Public Works (DPW)

The DPW's role on the Strike Team includes:

- The Director or his designee to attend Strike Team public meetings;
- Research and collection of DPW permits;
- Research and collection of DPW issues, complaints, and enforcement actions;
- Attend staff meetings;
- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.4 County Fire Department (Fire)

The Fire Department's Fire Prevention Bureau/Petroleum Chemical Unit and the Health Hazardous Materials Division roles on the Strike Team includes:

- The Fire Chief or his designee to attend Strike Team public meetings;
- Research and collection of fire prevention permits;
- Research and collection of Certified Unified Program Agency-CUPA permits (hazardous materials, hazardous waste, above ground petroleum storage, and California Accidental Release Prevention Program-CalARP);
- Research and collection of fire issues, complaints, and enforcement actions;
- Attend staff meetings;
- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.5 County Counsel

County Counsel provides the following assistance to the Strike Team:

- Review of contract for consultant assisting the County;
- Review and comment on Project documentation;
- Attend staff meetings;
- Attend Advisory Panel and Strike Team meetings;
- Advise County on legal positions as necessary; and
- Review and comment on draft reports.

1.5.6 Strike Team Members

The Strike Team consists of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief, or their designees. The Strike Team reviews the reports provided by Project Staff, holds public meetings to discuss the reports, and decides to submit the reports to the Board of Supervisors.

1.5.7 Project Staff

The Project Staff consists of staff from DRP, DPH, DPW, Fire, and MRS Environmental, Inc, the consultant assisting the County with the Project. In addition, staff from the California Geologic Energy Management Division (CalGEM) formerly known as the California Department of Conservation's Division of Oil, Gas and Geothermal Resources (DOGGR), the South Coast Air Quality Management District (SCAQMD), and Los Angeles Regional Water Quality Control Board (LARWQCB) have volunteered to assist the County in this effort.

1.5.8 Strike Team Advisory Panel

The Advisory Panel consists of five members. Each member was appointed by a Board District Office. The Advisory Panel members are issue area experts in oil and gas, environmental, and/or health issues. The Advisory Panel's role in the Project is to review, comment, and provide written input on the Project reports. The Advisory Panel consists of the following members listed below.

- Julia May (1st District)
- Formerly, Andrew Weissman (2nd District)
- As of June 2021, John Fleming (2nd District)
- Tim O'Connor (3rd District)
- Matt Rezvani (4th District)
- R. Rex Parris (5th District)

2.0 Progress Update

This report is the fifth and final report for the Strike Team Phase II effort; this section provides a summary of the Project activities completed through September 2021. Tasks completed include expanded and updated analysis for the following:

- Three Project Staff meetings;
- Coordination and correspondence with CalGEM (formerly DOGGR) on data request on orphan and abandoned wells;
- Review of the CalGEM WellSTAR database for orphan, abandoned, and idle wells;
- Update of unincorporated County orphan and abandoned well database and associated mapping;
- Development of an idle well data base and associated mapping;
- Coordination and correspondence with the Office of the State Fire Marshall on data request for pipeline mapping, pipeline operator data submittal forms (PSD-101) and pipeline inspection data;
- Review of Pipeline and Hazardous Materials Safety Administration National Pipeline Mapping System (NPMS) database;
- Development of unincorporated County pipeline (NPMS) database and associated mapping;
- Continued review of sources of data for oil and gas storage facilities;
- Review of South Coast Air Quality Management District (SCAQMD) Rule 1148.2 database for oil and gas drilling, well completion, and well rework chemical use;
- Refinement of the risk prioritization method for abandoned wells;
- Detailed mapping of abandoned wells;
- Updating the abandoned and idle well site inspection checklist;
- Continued review of an additional sets of California State Fire Marshal (CSFM) PSD-101 Pipeline Operator Annual reports;
- Continued review and update of the EPA Toxic Release Inventory data base on chemical use;
- Continued review of the California Environmental Reporting System (CERS) data base on chemical use;
- Development of a risk prioritization method for idle wells;
- Mapping of the high priority idle wells;
- Development of a risk prioritization method for pipelines;
- Update through June 2021 of the South Coast Air Quality Management District (SCAQMD) Rule 1148.2 database for oil and gas drilling, well completion, and well rework chemical use;
- Addition of case studies of select recent well and pipeline incidents;
- Addition of a discussion on the underground gas storage facilities;
- Field inspection of abandoned and idle wells; and
- Development of findings and recommendations for this final report.

2.1 Chronology of Project Meetings

2.1.1 Project Staff Meetings

Five Project Staff meetings have occurred with the first, the initial kick off meeting for the Project Staff, occurring on Thursday October 25, 2018. The meetings are attended by representatives from DRP, DPH, DPW, Fire, CalGEM, and RWQCB. Staff from MRS Environmental also attended. The meetings are summarized below.

- Project Staff Kick Off Meeting - October 25, 2018.
    - Introduction of Project Staff – Staff from each participating County agency, CalGEM and MRS Environmental were introduced, and contact information was distributed.
    - Purpose of the Project – The Board motion was discussed along with primary Project tasks.
    - Timeline for first report – The first report would be issued as a draft in March 2019.
    - Roles and responsibilities and regulatory authority – Project goals and agency responsibilities were discussed with each department or agency providing input on the process.
- Project Staff Meeting Report 1 - March 11, 2019
    - Project Staff met to review and comment on the first draft report. The meeting was attended by staff from DRP, DPH, DPW, Fire, and RWQCB. Comments were received from DPH.
- Project Staff Meeting Report 2 – September 17, 2019.
    - Project Staff met to review and comment on the second draft report. The meeting was attended by staff from DRP, DPH, DPW, Fire, and RWQCB. Comments were received from DPH.
- Project Staff Meeting Report 3 – March 11, 2020.
    - Project Staff met to review and comment on the third draft report. Comments were received from DRP, DPH, DPW, and CalGEM.
- Project Staff Meeting Report 4 – March 3, 2021.
    - Project Staff met to review and comment on the fourth draft report. Comments were received from DRP, DPH, Fire, and SCAQMD.

2.1.2 Strike Team Meetings

The Strike Team met on March 21, 2019, at the Regional Planning Commission (RPC) Hearing Room where the DRP and MRS Environmental provided a presentation to the Strike Team on the findings of the first report. Subsequently, members of the Strike Team asked questions on the Strike Team efforts and findings and provided comments on the Report. The DPH provided comments on the need to ensure that wells near people are assigned a higher ranking in the

prioritization process to identify those abandoned wells with the potential to leak and impact the public health and safety of nearby communities. No public comments were provided at the meeting.

The second report was discussed by the Strike Team at a meeting held on September 24, 2019, at the RPC Hearing Room. No public comments were provided at the meeting.

The Strike Team met on June 1, 2020, originally scheduled for March 25, 2020 and postponed due to COVID-19, virtually via a Zoom meeting to discuss the third report. No public comments were received at the meeting. The Strike Team was also scheduled to meet September 2020, however, that meeting was cancelled due to COVID-19.

The Strike Team discussed the fourth report on March 24, 2021, with a virtual Zoom meeting. No public comments were received at the meeting.

The final report was discussed in a joint meeting of the Strike Team and the Advisory Panel on September 15, 2021.

2.1.3 Strike Team Advisory Panel Meetings

The Strike Team Advisory Panel met on April 22, 2019 with Advisory Panel members Timothy O'Connor and Matt Rezvani in attendance and Julia May via teleconference. The first report was discussed, and Advisory Panel comments were submitted to the Board on April 25, 2019.

The Advisory Panel discussed the second report at an October 21, 2019 meeting. Advisory Panel members Timothy O'Connor and Matt Rezvani attended with Julia May participating via teleconference. The Panel discussed and provided comments on the second report, those comments were subsequently forwarded to the Board.

The third report was discussed by the Advisory Panel in a virtual Zoom meeting dated June 30, 2020. The Panel, with members Andrew Weissman, Matt Rezvani, and Tim O'Conner attending, discussed the report but did not provide any comments. The October 2020 Advisory Panel meeting was cancelled due to COVID-19.

The Advisory Panel discussed the fourth report in a virtual Zoom meeting on April 20, 2021. Panel members Matt Rezvani, Tim O'Conner and Julia May attended with comments provided by Julia May.

3.0 Orphan and Abandoned Wells

Project Staff has continued coordination and correspondence with CalGEM on orphan and abandoned wells, provided review and input regarding the re-abandonment of Well DOW RGC-10, and developed a database of orphan and abandoned wells in the unincorporated County. Discussion on the status of this effort is provided in the following sections.

3.1 CalGEM Data Request

Staff from CalGEM (formerly DOGGR) attended the Kickoff meeting on October 25, 2018 and provided Project Staff with an overview to the WellSTAR project which updates and revises the WellFinder database, and input on CalGEM recent efforts on idle and abandoned wells. CalGEM's expertise and data are key components to the orphan and abandon well issue. Project Staff correspondence with CalGEM for additional input is listed below.

- 9/19/2018 – Project Staff correspondence including meeting request sent to CalGEM.
- 12/11/2018 – Project Staff correspondence and including meeting request sent to CalGEM.
- 1/14/2019 – Project Staff meeting request sent to CalGEM.
- 1/15/19 –Response received from CalGEM detailing CalGEM Central and Southern Section coordination efforts on Project Staff request.
- 5/8/19 – Project staff met with CalGEM via teleconference on the WellSTAR database status and abandoned well issues.
- 5/24/19 - CalGEM provided the County with additional information covering the following requests:
    - An excel spreadsheet containing updated well list for Los Angeles County. A data column with abandonment dates for wells that have been plugged and abandoned will be provided separately.
    - An excel spreadsheet containing the orphan well list for Los Angeles County as of May 23, 2019. Currently there are no "declared" orphan wells within Los Angeles County. However, CalGEM is currently evaluating approximately 1,272 potential orphan/deserted wells within the County.
    - An excel spreadsheet listing the LA County wells abandoned by the State.
- On July 2, 2019, CalGEM provided DRP with an excel spreadsheet with water level data from idle wells within the Los Angeles County.
- February 20, 2020, CalGEM provided a response to a PRA for information on the 128 high priority wells including historical documents and plugging and abandonment information.

3.2 CalGEM Database and Abandoned Well Preliminary Prioritization

The CalGEM database of wells as provided by CalGEM in May 2019 was utilized to develop a prioritization scheme based on several different criteria. The prioritization scheme is utilized to identify those abandoned wells that are most likely to leak and, if they do leak, of impacting the public health and safety of nearby communities. This prioritization scheme was consulted with and ratified by CalGEM on a call conducted April 7, 2020 with CalGEM, DRP and MRS Environmental. The CalGEM data base is available to the public via the Well Finder online mapping application.

For many older wells the exact location of abandoned wells is only an estimate in the CalGEM database as illustrated by the Marina del Rey incident well location which was not found at the database location but was offset by 70-80 feet from the database location. However, the approximate location of the abandoned wells and other information in the CalGEM database such as the well location relative to other active wells and information on the field in which the wells are located allows for a prioritization scheme to be developed. In addition, the approximate location of the well along with the population density as estimated by historical census data allows for an understanding of potential impact if a well leaks or blowouts relative to populations.

The abandoned wells were prioritized based on their potential impact to public health and safety related to the potential for leakage of gas or other hazardous substances to the surface. Wells were prioritized based on the following characteristics:

- Well status (plugged or unknown);
- Well location and census block population density;
- Historical well type;
- Well location within 500 feet of an active injector well;
- Age of well by spud date (date on which well drilling commenced);
- Well located in an oil and gas field by field age;
- Reservoir characteristics;
- The location of the well relative to the Cal EnviroScreen 3.0 analysis; and
- The location of the well relative to the Los Angeles County methane zones and proximity to landfill methane areas.

Each of these along with the prioritization method are discussed below.

3.2.1 Well Status

Figure 3-1 shows the location of all plugged and abandoned wells in the unincorporated areas of the County of Los Angeles as of the May 2019 CalGEM database. The CalGEM database includes 4,443 total wells in the unincorporated areas, with the characteristics shown in Table 3.1.

Table 3.1 Wells in the Los Angeles County Unincorporated Area

Category	Number
Active wells[1]	1,046
Canceled wells (well application cancelled)[2]	18
Idle wells[3]	637
Permitted (recent or currently being drilled)[4]	5
Plugged & Abandoned wells[5]	2,731
Unknown wells (not classified by CalGEM)[6]	6
Total wells	**4,443**

Source: CalGEM May 2019.

1. Active wells are well that are currently producing oil and/or gas.
2. Cancelled wells are wells that were planned to be drilled and received permits but were not drilled.
3. Idle wells defined by CalGEM as a well that has not been used for two years or more and has not yet been "plugged and abandoned" per CalGEM requirements. This could include an idle well that is actively managed as part of an Idle Well Management Program, or an idle well that is buried and no longer accessible or maintained.
4. New wells are wells that are recent or are currently being drilled and are currently only located at Sentinel Peak Resources Inglewood and at Matrix Sansinena oil fields.
5. Plugged and abandoned wells are wells that have undergone a plugging and abandonment procedure according to CalGEM procedures at the time of the plugging and abandonment.
6. Unknown wells are wells whose status is not known and are currently only located at Sentinel Peak Resources Inglewood and at Browning-Ferris Industries of California, Inc.

Note: an orphan well is a well that has no party responsible for it, leaving the State to plug it if needed.

3.2.2 Abandoned Well Location and Census Block Population Density

Well locations were overlaid with the census data by census block to identify wells that are located near high density areas. The focus of this effort is on the possible effects on human populations and not on other possible environmental degradation (e.g., Significant Ecological Areas). Wells that are in low population density areas do not provide as high a priority since a leak would have a lower probability of impacting the public. Many abandoned wells are in sparsely populated areas and those wells are not as high a priority as the abandoned wells located in more densely populated areas. Figure 3-2 shows the location of the abandoned wells relative to the census population density. Table 3.2 shows the number of abandoned wells by location relative to the census population density.

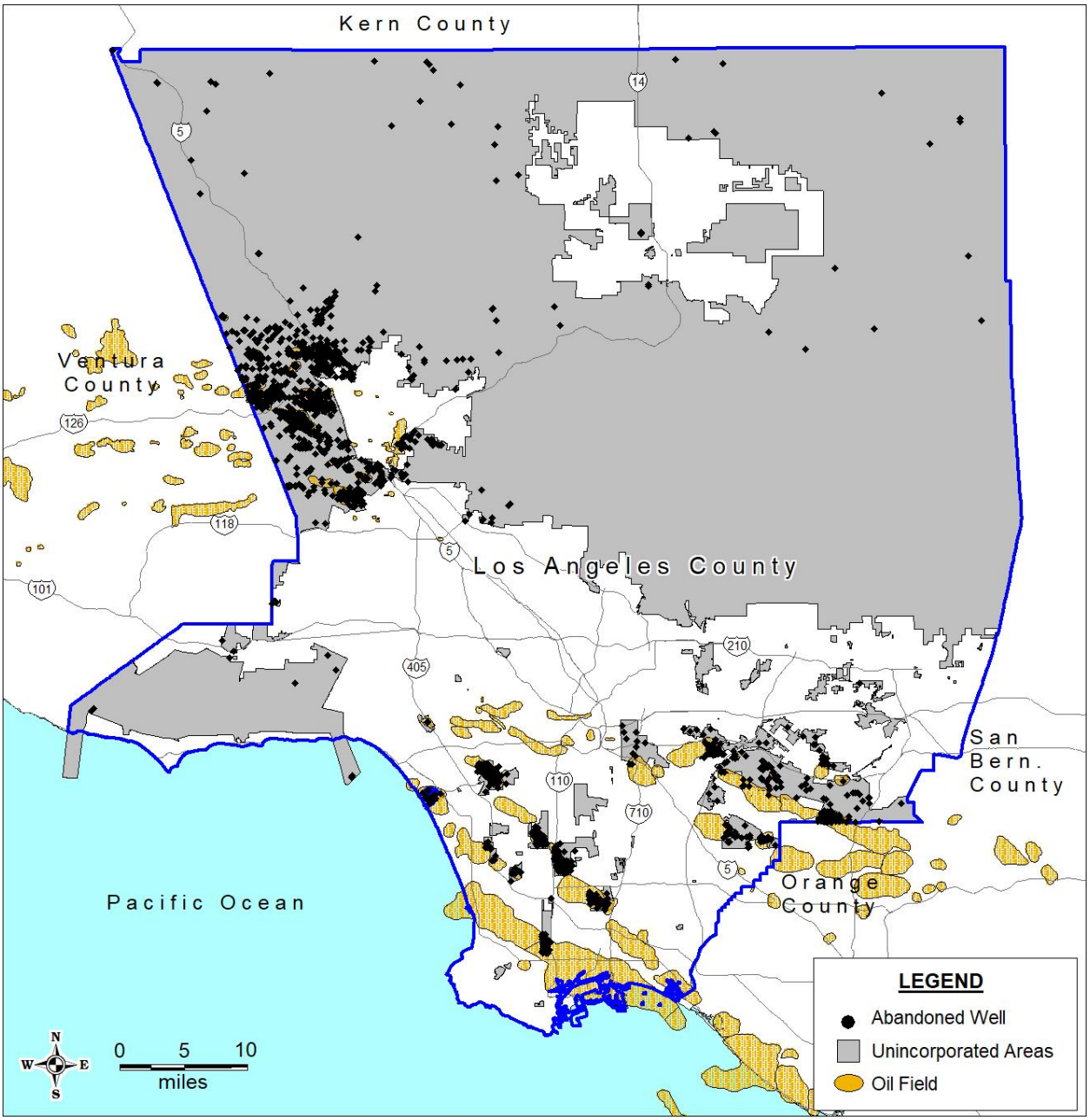
Table 3.2 Abandoned Wells by Population Density

Population Density	Number	Number Percent	Cumulative*	Cumulative Percent*
Between zero and 900 persons per square mile	2163	79%	2731	100%
Between 900 and 4,699 persons per square mile	285	10%	568	21%
Between 4,700 and 8,899 persons per square mile	110	4%	283	10%
Between 8,900 and 13,099 persons per square mile	99	4%	173	6%
More than 13,099 persons per square mile	74	3%	74	3%

Source: CalGEM May 2019.

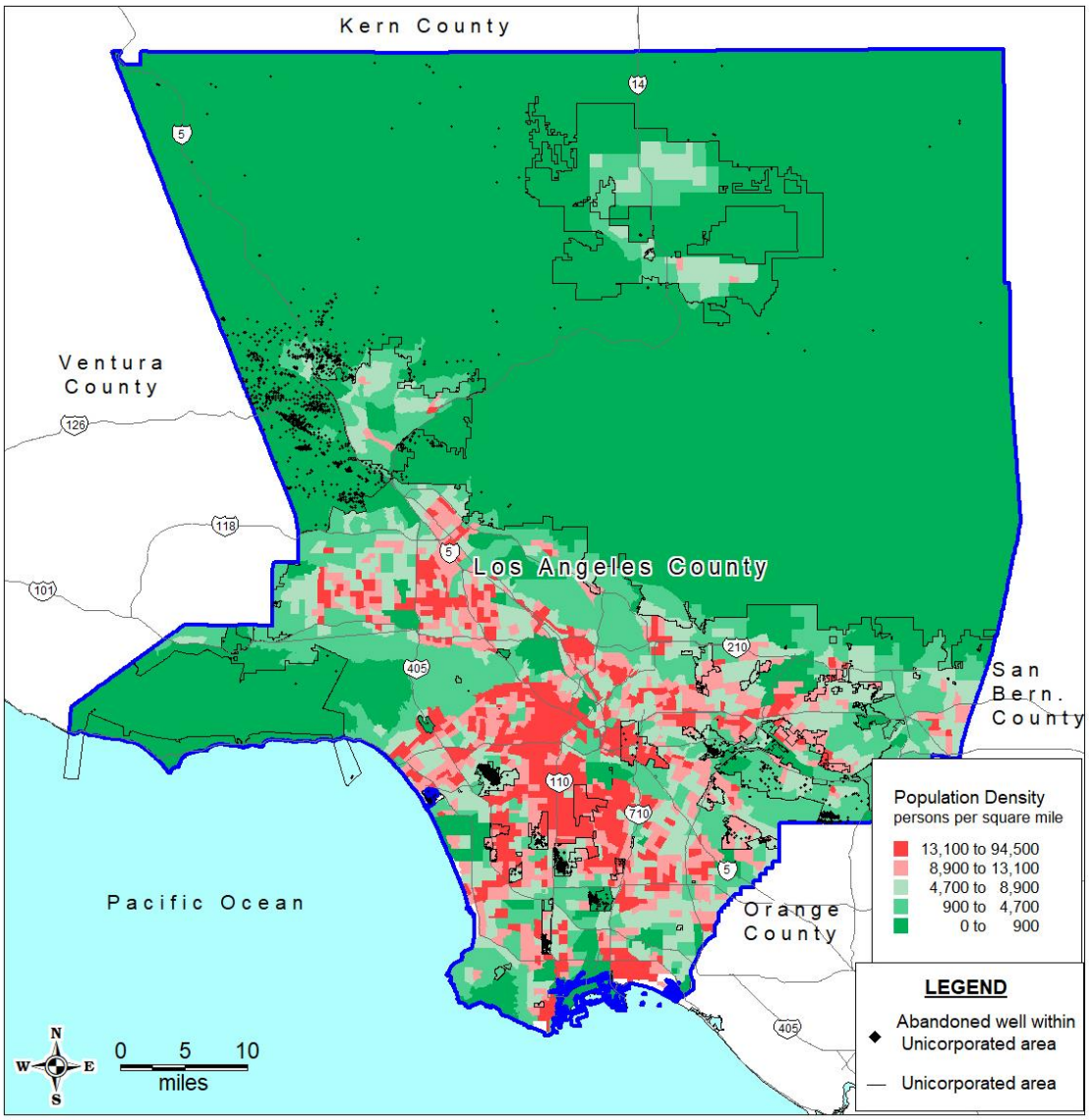
Note: * Data presented to show the total number of wells more than the minimum level in that category: i.e., defines the number of wells that might need to be included in a high priority listing if that minimum threshold were selected. In the cumulative category, the number of wells does not sum to the total well count because some wells are included in multiple categories.

Figure 3-1 Plugged, Abandoned and Unknown Wells



Source: CalGEM May 2019.
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Figure 3-2 Abandoned Wells and Census Block Population Density



Source: CalGEM May 2019.
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.2.3 Abandoned Well Type

Wells are classified by the type of well including oil and gas, gas storage, water source, etc. Wells that resulted in dry holes, for example, would present a lower priority than wells that were historically used for oil and gas production or multiple uses, although dry-hole wells could still present a risk if gas was encountered during the drilling process. A dry hole is commonly defined

as a well that is drilled but does not produce enough oil or gas to be a commercial success. Table 3.3 shows the number of abandoned wells by type in the unincorporated areas.

Table 3.3 Abandoned Wells by Type

Well Type	Number	Percent
Core Hole	9	0.3%
Dry Hole	636	23.3%
Gas	5	0.2%
Gas Storage	27	1.0%
Injection	157	5.7%
Multiple use	101	3.7%
Oil and Gas	1,793	65.7%
Water Source	3	0.1%
TOTAL	2,731	100 %

Source: CalGEM May 2019.

3.2.4 Well Location and Active Injector Well

The abandoned well location in relation to active injector wells gives rise to the potential for leakage from a well due to the increased reservoir pressures near the injection wells. Figure 3-3 shows the location of abandoned wells that are located within 500 feet of an active injection well and located within the unincorporated parts of the County. About 354 plugged and abandoned wells are located within 500 feet of an active injector well.

3.2.5 Well Age by Spud Date

Older wells increase the likelihood that abandonment was not performed to as high a standard as the current requirements. Although the date the well was started is not the same as the date the well was abandoned, it does provide some indication of the potential for lower quality abandonments which would increase the probability of the well leaking and affecting public health. Information on the abandonment date of the wells is not located in the CalGEM database and is an issue that is incorporated once the wells are initially prioritized, which then involved the review of historical paper files associated with each high priority well. Information initially obtained from CalGEM only listed wells that have been abandoned since 2004 and does not include wells that were abandoned before that date.

The CalGEM database only lists the spud date (e.g., the date drilling was started) for a limited number of wells. For abandoned wells only about 8 percent have spud date information in the CalGEM database for wells located in the unincorporated areas. These wells, as a function of age, are shown in Figure 3-4 and listed in Table 3.4.

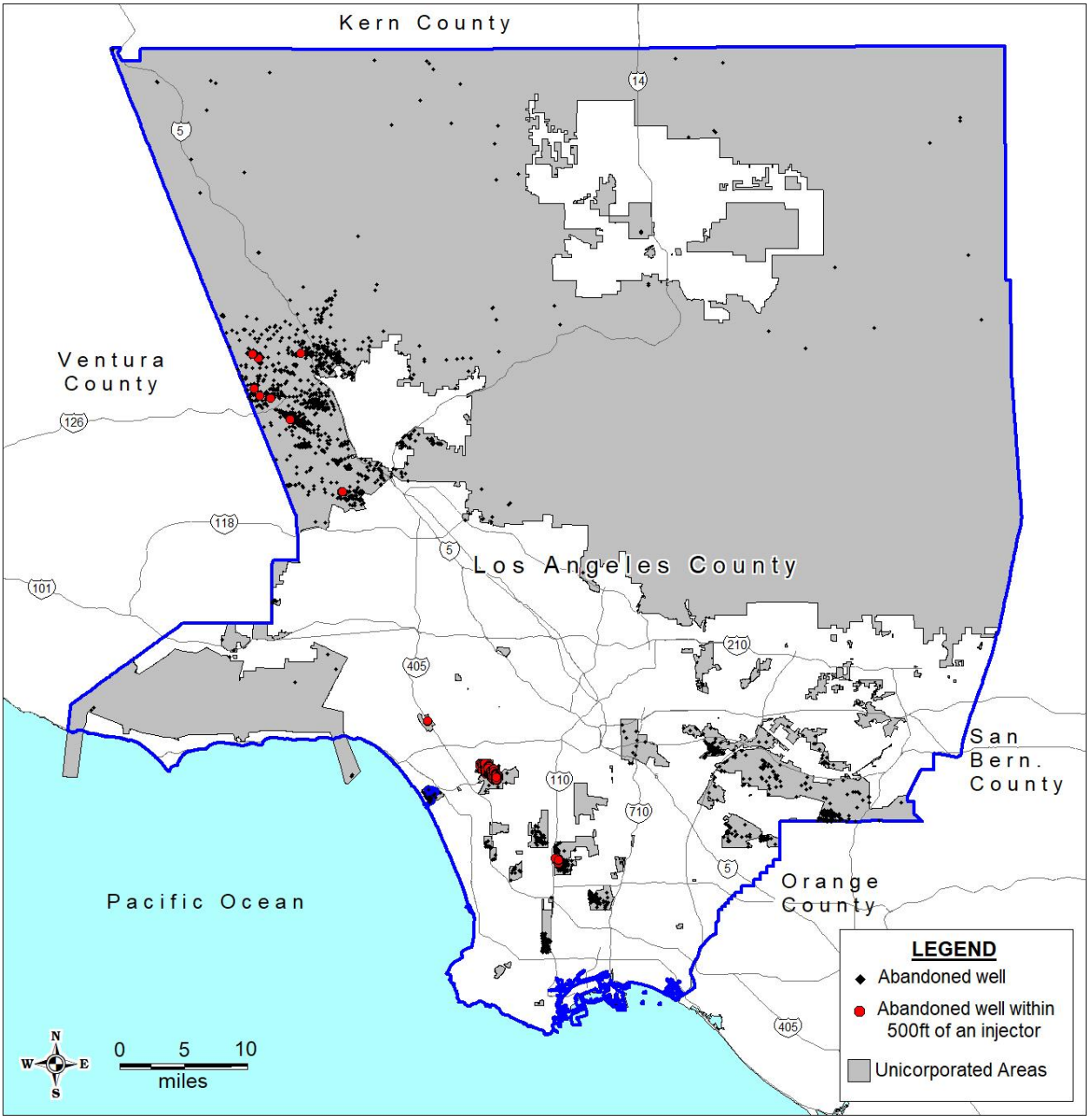
Table 3.4 Abandoned Wells by Spud Date Age

Well Spud Date Age, Years	Number	Percentage of Total	Cumulative*	Cumulative Percent*
Between zero and 25 years	6	3%	225	100%
Between 25 and 34 Years	8	4%	218	97%
Between 35 and 44 Years	19	8%	210	93%
Between 45 and 54 Years	8	4%	191	85%
Between 55 and 64 Years	32	14%	183	81%
Between 65 and 74 Years	105	47%	151	67%
Between 75 and 84 Years	36	16%	46	20%
More than 85 Years	5	2%	10	4%

Source: CalGEM May 2019.

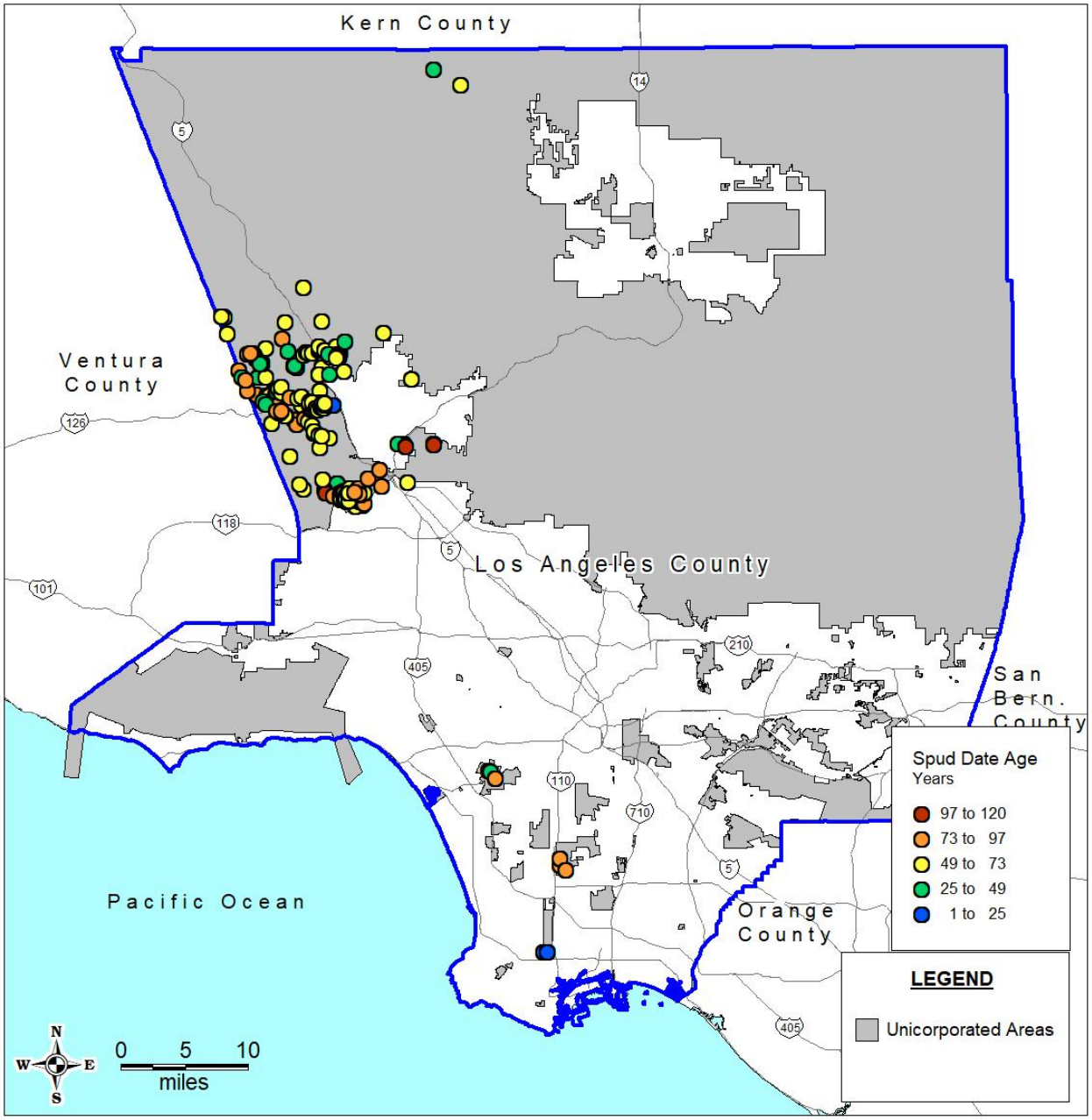
Note: * Data presented to show the total number of wells more than the minimum level in that category: i.e., defines the number of wells that might need to be included in a high priority listing if that minimum threshold were selected. In the cumulative category, the number of wells does not sum to the total well count because some wells are included in multiple categories.

Figure 3-3 Wells Located within 500 feet of an Active Injector Well



Source: CalGEM May 2019.
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Figure 3-4 Wells by Years from Spud Date



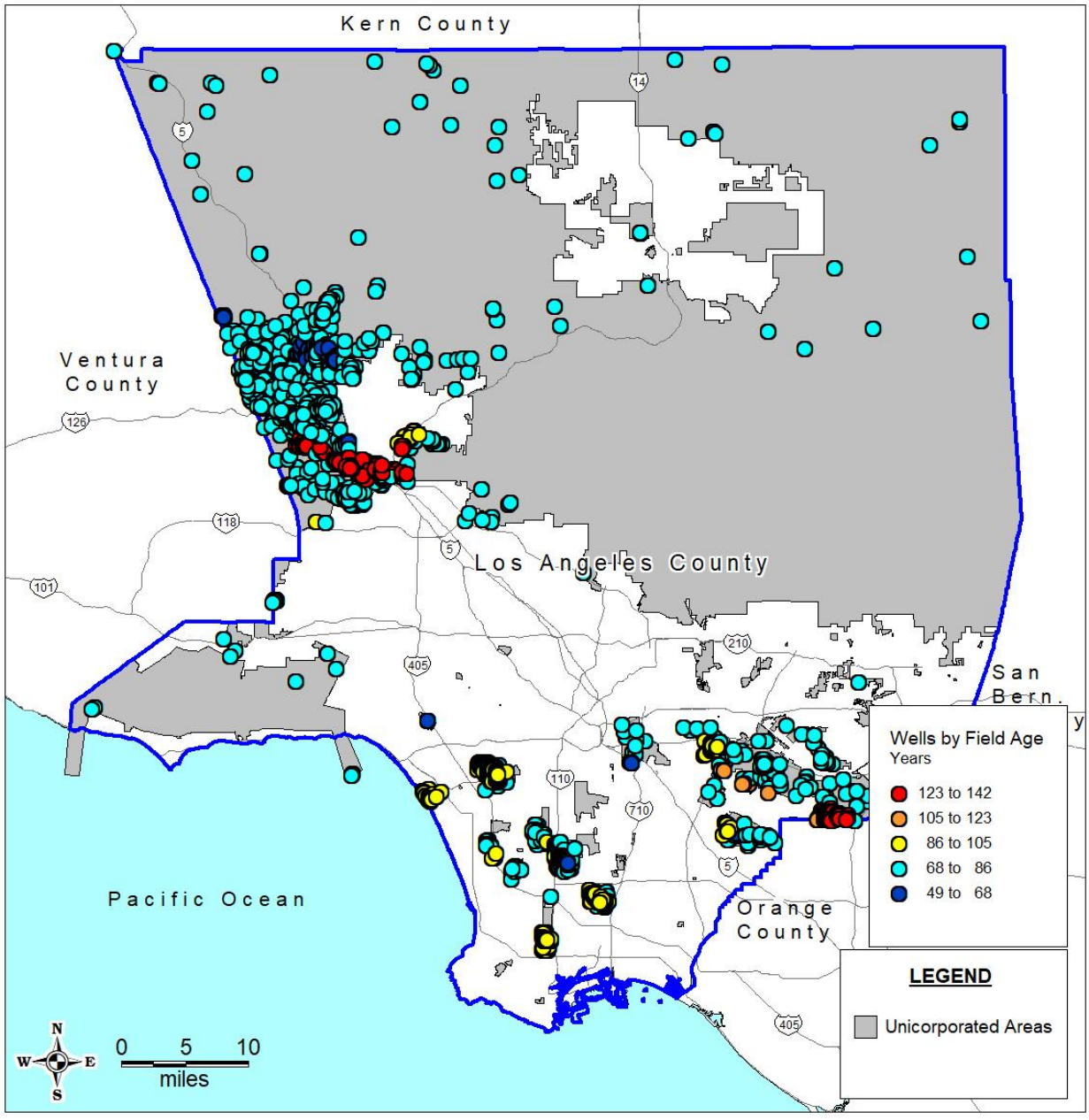
Source: CalGEM May 2019.
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.2.6 Abandoned Wells by Field Age

There are 46 oil fields located in the unincorporated area of Los Angeles County with the earliest field discovered in 1876 (CalGEM Oil and Gas Fields Volume 2). Fields are shown in Figure 3-5 and listed in Appendix D.

Abandoned wells located in older fields may have a higher probability of having older abandonment dates. As mentioned above, the CalGEM database does not have abandonment date, and this is an issue that was researched further after the prioritizations was applied (see section below). Field age is based on the oldest discovery date for all the reservoir pools identified in the CalGEM California Oil and Gas Fields Volume II (CalGEM 1991). Figure 3-6 and Table 3.5 show the wells by field age with each map dot representing one well and the age of the field in which the well is located.

Figure 3-5 Wells by Field Age



Source: CalGEM May 2019.NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Table 3.5 Wells by Field Age

Well Field Age, Years	Number	Percent of Total	Cumulative*	Cumulative Percent*
After 1969 (0 - 50 years)	5	0.2%	2731	100.0%
Prior to 1969 (51- 75 years)	393	14.4%	2726	99.8%
Prior to 1944 (76 - 100 years)	1846	67.6%	2333	85.4%
Prior to 1919 (101-124 years)	133	4.9%	487	17.8%
Prior to 1894 (more than 125 years)	354	13.0%	354	13.0%

Source: CalGEM May 2019.
Note: * Data presented to show the total number of wells more than the minimum level in that category: i.e., defines the number of wells that might need to be included in a high priority listing if that minimum threshold were selected. In the cumulative category, the number of wells does not sum to the total well count because some wells are included in multiple categories.

3.2.7 Abandoned Wells by Reservoir Characteristics

The fields in which the wells are located were ranked by several different characteristics that could contribute to increased risk of abandoned well leakage. Field information was developed from pools identified in the CalGEM California Oil and Gas Fields Volume II (CalGEM 1991). Issues that could contribute to increased risk of well leakage would include the following:

- High Gas Oil Ratio (GOR);
- Older Fields;
- Shallow reservoirs;
- High API gravity of the produced oil;
- High sulfur content of the crude oil; and
- High pressure gradients (psi per linear foot of well depth).

Each of these field characteristics were assigned points from zero to two based on the scoring matrix shown in Table 3.6. Fields were then ranked based on the sum total of the scores with a maximum ranking of 12 points. Fields with a higher rank score may have a higher probability of having abandoned wells that produce greater well leakage risk.

Table 3.6 Field Rank Scoring Matrix

Field Score			
Characteristic	**Score of 0 points**	**Score of 1 point**	**Score of 2 points**
GOR	Less than 100	Between 100-1000	Greater than 1000
Initial Production Date	After 1950	1930 - 1950	Before 1930
Depth	Greater than 5000 ft	Between 1000 - 5000 ft	Less than 1000 ft
API[1]	Less than 20	Between 20 - 30	Greater than 30
Sulfur/H_2S[2]	Less than 0.5 %	Between 0.5 - 1.5 %	Greater than 1.5
PSI/ft	Less than 1.0 psi/ft	between 1 - 2 psi/ft	Greater than 2.0 psi/ft

Source: CalGEM May 2019.
1 – American Petroleum Institute gravity of oil relative to water, higher numbers are associated with lighter oil.

2 – Only Torrance and Brea-Olinda fields have the potential for H2S, as per CalGEM Publication M10. These two fields were given the highest rating for sulfur. All other fields were based on crude sulfur content which is not necessarily indicative of H_2S levels but may indicate some elevated level of odor or hazard.

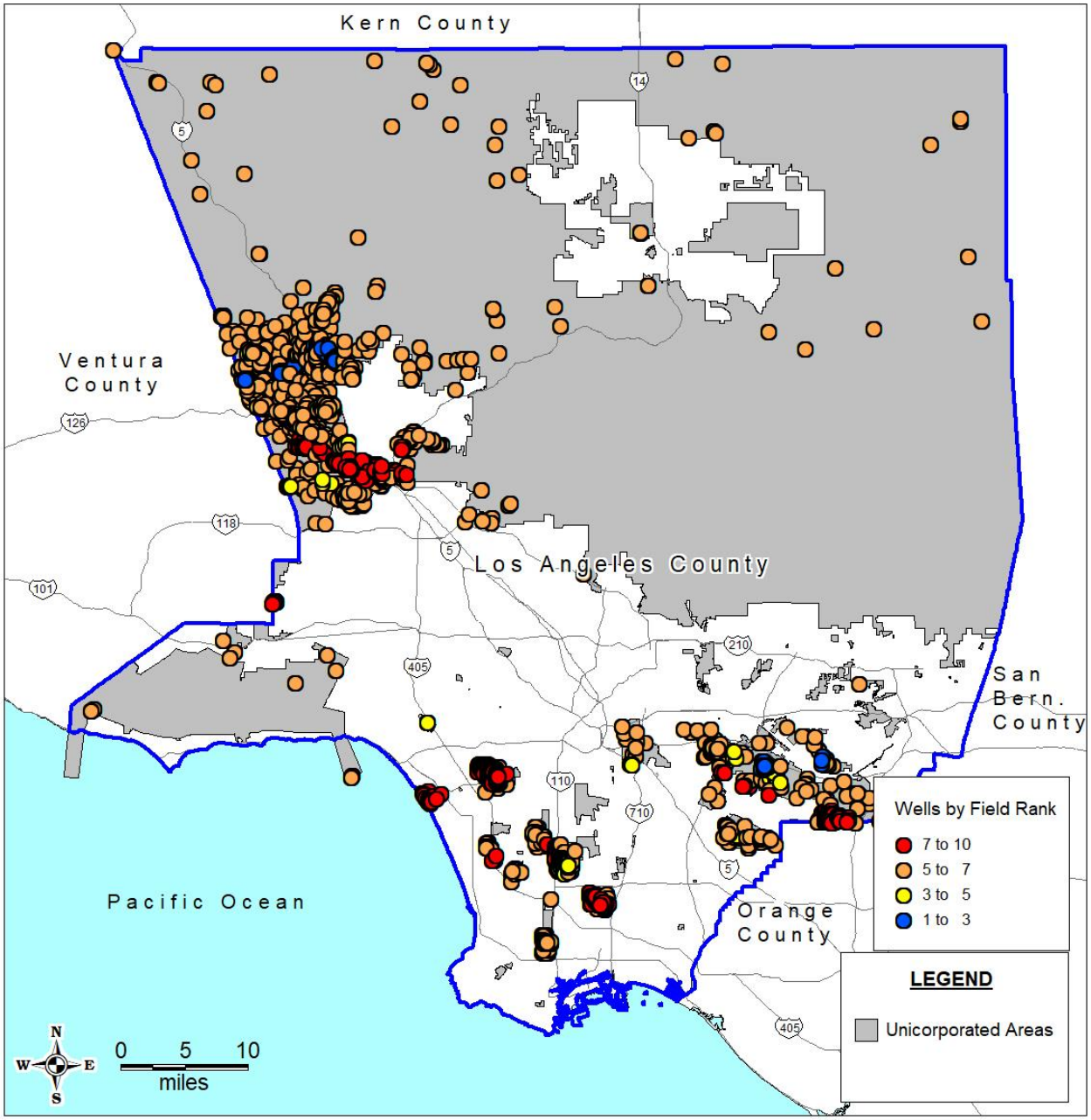
Figure 3-6 and Table 3.7 shows the wells based on the field rankings discussed above. Note that the Marina Del Rey field discussed in Section 3.2 above received a score of seven on the above matrix.

Table 3.7 Wells Based on Field Ranking

Well Field Rank	Number of Abandoned Wells	Percentage	Cumulative*	Cumulative Percent*
1	55	2%	2731	100%
2	52	2%	2676	98%
3	21	1%	2624	96%
4	61	2%	2603	95%
5	704	26%	2542	93%
6	487	18%	1838	67%
7	119	4%	1351	49%
8	278	10%	1232	45%
9	592	22%	954	35%
10	362	13%	362	13%
TOTAL	2,731	100%	-	-

Source: CalGEM May 2019.
Note: Maximum score is 12, no wells ranked scored 11 or 12.
Note: * Data presented to show the total number of wells more than the minimum level in that category: i.e., defines the number of wells that might need to be included in a high priority listing if that minimum threshold were selected. In the cumulative category, the number of wells does not sum to the total well count because some wells are included in multiple categories.

Figure 3-6 Wells by Field Rank



Source: CalGEM May 2019.
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.2.8 Abandoned Wells by EnviroScreen Score

In January 2017, the Office of Environmental Health Hazard Assessment (OEHHA), on behalf of the California Environmental Protection Agency (CalEPA), released Version 3.0 of the California Communities Environmental Health Screening Tool (CalEnviroScreen). CalEnviroScreen version 3.0 identifies California communities by census tract that are disproportionately burdened by, and vulnerable to, multiple sources of pollution. The tool ranks each of the state's 8,000 census tracts using data on 20 indicators of pollution, environmental quality, and socioeconomic and public health conditions. SB 535 requires CalEPA to identify disadvantaged communities based on geographic, socioeconomic, public health and environmental hazard criteria, and the CalEnviroScreen tool is utilized to allow for this requirement. Environmental exposures and effects examined as part of the CalEnviroScreen model include:

- Ozone concentrations in air.
- PM 2.5 concentrations in air.
- Diesel particulate matter emissions.
- Drinking water contaminants.
- Use of certain high-hazard, high volatility pesticides.
- Toxic releases from facilities.
- Traffic density.
- Drinking water quality.
- Cleanup sites.
- Groundwater threats.
- Hazardous and solid waste facilities/generators.
- Impaired water bodies.

Sensitive population and socioeconomic factors addressed include:

- Asthma rates.
- Cardiovascular disease rates.
- Low birth rate frequency.
- Education attainment.
- Housing burden.
- Linguistic isolation.
- Poverty.
- Unemployment.

Plugged and abandoned wells were classified based on the CalEnviroScreen percentile score for each census tract. The results are shown in Table 3.8 and Figure 3-7.

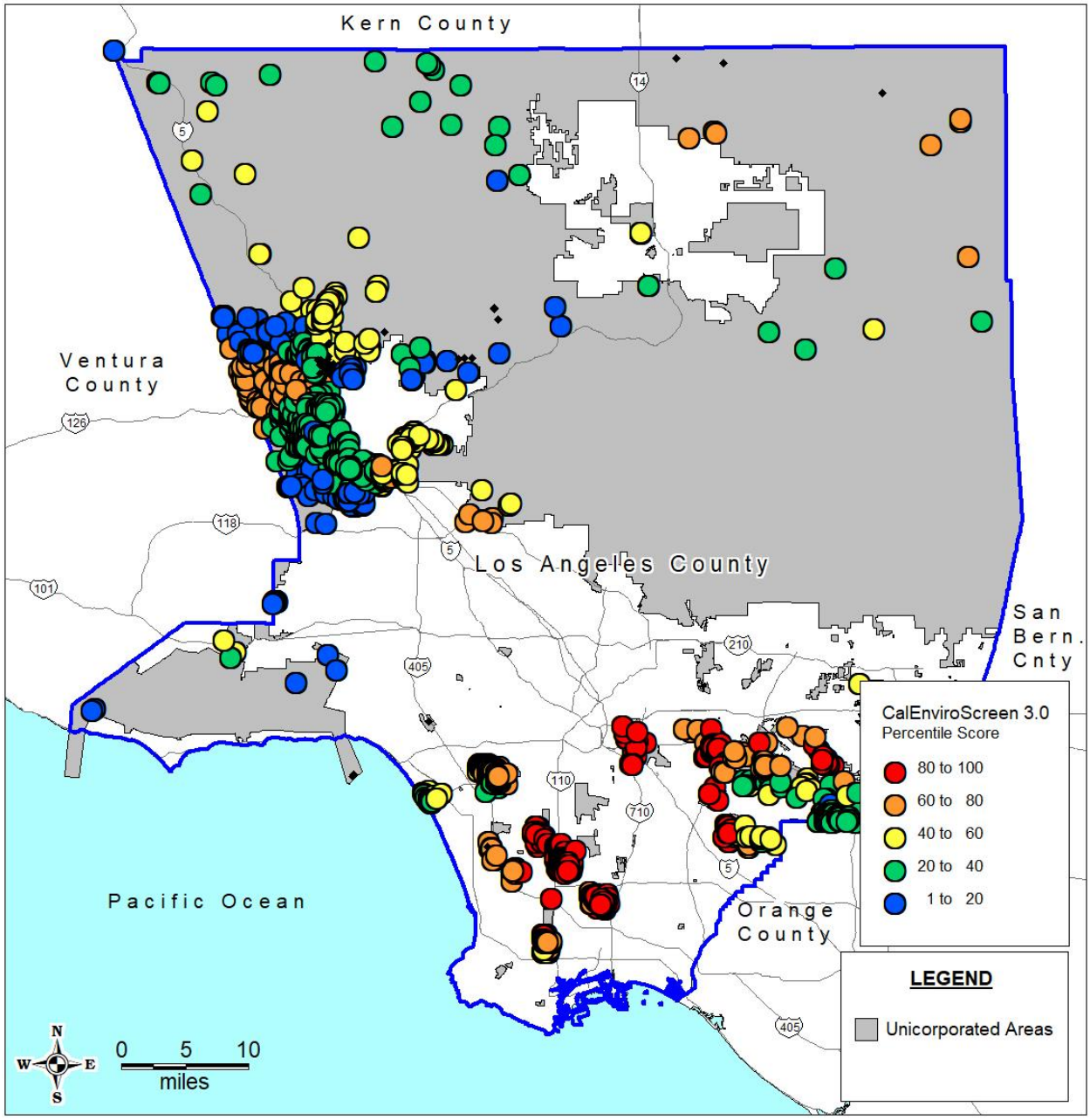
Table 3.8 Wells Based on CalEnviroscreen 3.0 Percentile

CalEnviroscreen 3.0 Percentile	Number	Number Percent	Cumulative*	Cumulative Percent*
More than 90%	345	13%	345	12.6%
Between 81 and 90%	130	5%	475	17.4%
Between 71 and 80%	175	6%	650	23.8%
Between 61 and 70%	614	22%	1264	46.3%
Between 51 and 60%	66	2%	1330	48.7%
Between zero and 50%	1401	51%	2731	100.0%

Source: CalGEM May 2019. CalEPA 2018.

Note: * Data presented to show the total number of wells more than the minimum level in that category: i.e., defines the number of wells that might need to be included in a high priority listing if that minimum threshold were selected. In the cumulative category, the number of wells does not sum to the total well count because some wells are included in multiple categories.

Figure 3-7 Wells by CalEnviroscreen 3.0 Percentile



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3.2.9 Abandoned Wells by Methane Zone

The County of Los Angeles Building Code prohibits the issuance of building permits for new buildings, enclosed structures, additions, or conversions of a building or structure to habitable or occupiable space in the presence of an unmitigated potential gas hazard. Potential gas hazards exist within 1,000 feet of fill sites containing decomposable materials (Building Code Section 110.3),

within 300 feet of nearby oil and gas wells (Building Code Section 110.4), and on contaminated soils (Building Code Section 110.5). Twenty-two plugged and abandoned wells were identified that are within 1,000 feet of a designated methane zone.

3.2.10 Abandoned Wells Prioritization

A prioritization scheme was developed based on the above factors to prioritize the plugged and abandoned wells for further, more detailed examination. Further examination included review of documents related to abandonment activities, such as blowouts and loss-of-well control history, that required detailed, historical records reviews. See the section below for a summary of the results of this detailed review. As the review of detailed records is time consuming, the prioritization scheme is used to filter the thousands of wells in the CalGEM database to those of the highest priority to conduct a detailed document review and in-field testing and examinations.

The prioritization scheme goal is to identify those wells that have the highest probability of leaking to the surface and combine that with the potential for impacts to the community. This is a similar approach used to develop the Enviroscreen scores by OEHHA. Although a well might have a high potential for leakage, if it is in an area designated by census data as having very low or no populations, then it would not be classified as a high priority well. Table 3.9 shows the prioritization scheme.

Table 3.9 Well Prioritization Scheme

Factor	Ranking Score	Score Distribution
Location Near injectors	0 - 5 points	0 points not near an injector 5 points if near an injector
Spud Data age	0 - 5 points	Less than 45 years old = 0 points 45 – 55 years = 1 point 55 – 65 years = 2 points 65 – 75 years = 3 points 75 – 85 years = 4 points > 85 years = 5 points No data= 3 points
Field Ranking	0 - 10 points	Field ranking of zero = zero points Field ranking = points Field ranking of 10 or more = 10 points
Methane zone	0 - 5 points	Not near a methane zone = zero points Near a methane zone = 5 points
Enviroscore	0 - 5 points	Below 50% = zero points 50 – 60% = 1 point 60 – 70% = 2 points 70 – 80% = 3 points 80 – 100% = 4 points Score of 100 = 5 points

Table 3.9 Well Prioritization Scheme

Factor	Ranking Score	Score Distribution
Census data	0-10 points	0 population = zero points Units in persons per square mile 0 – 2,000 = 1 point 2,000 – 4,000 = 2 points 4,000 – 6,000 = 3 points 6,000 – 8,000 = 4 points 8,000 - 10,000 = 5 points 10,000 – 12,000= 6 points 12,000 – 14,000 = 7 points 14,000 – 16,000 = 8 points 16,000 – 18,000 = 9 points More than 18,000 = 10 points

Source: CalGEM May 2019. CalEPA 2018.

The prioritization scheme is conducted by summing the points associated with factors that could increase the probability for a well to be leaking (location near injectors, spud date age, field ranking and methane zone) and then multiply that score by the sum of the census and the Enviroscreen scores. See Figure 3-8 for a schematic of the approach.

In total, the priority ranking produced scores ranging from zero to 143, with 128 wells ranking a score of above 75 and therefore classifying as a "higher priority well". Figure 3-9 shows the location of the higher priority wells. Note that the higher priority wells are generally located in the southern County areas in the areas with higher population density. Table 3.10 shows the number of higher priority wells by Planning District and by Supervisor District.

Appendix A shows details of the areas with the higher priority wells.

Table 3.10 Ranked Abandoned Wells by Districts

District	Number of Higher Priority Wells (Ranking 75 and above)
Planning District	
Westside Planning Area	19
East San Gabriel Valley Planning Area	8
Metro Planning Area	38
Gateway Planning Area	40
South Bay Planning Area	23
Supervisor District	
District 1	12
District 2	78
District 4	38

Note: Districts not shown have no high-ranking wells.
Note: Planning Districts from LA County General Plan November 2014.

Figure 3-8 Wells Prioritization Schematic

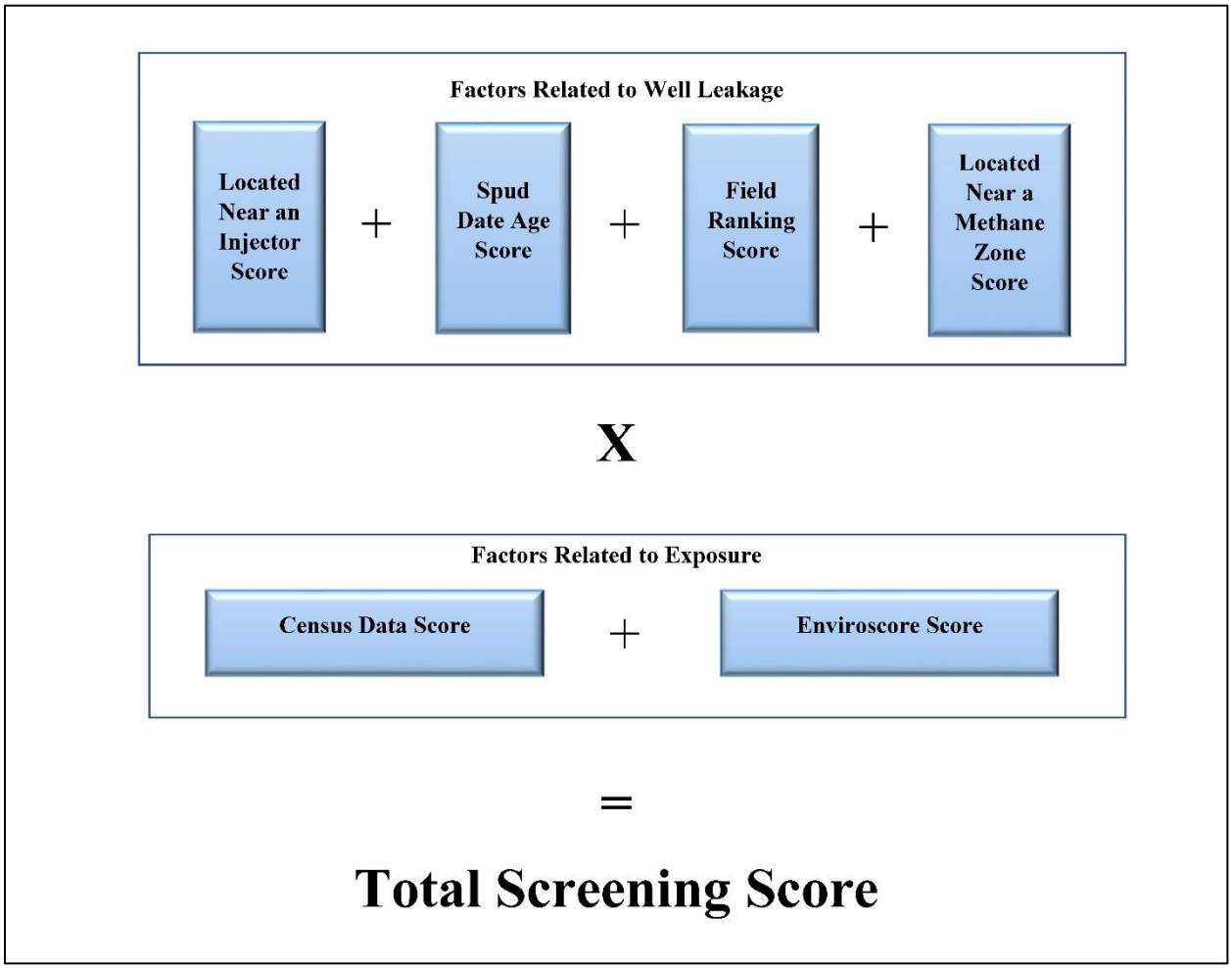
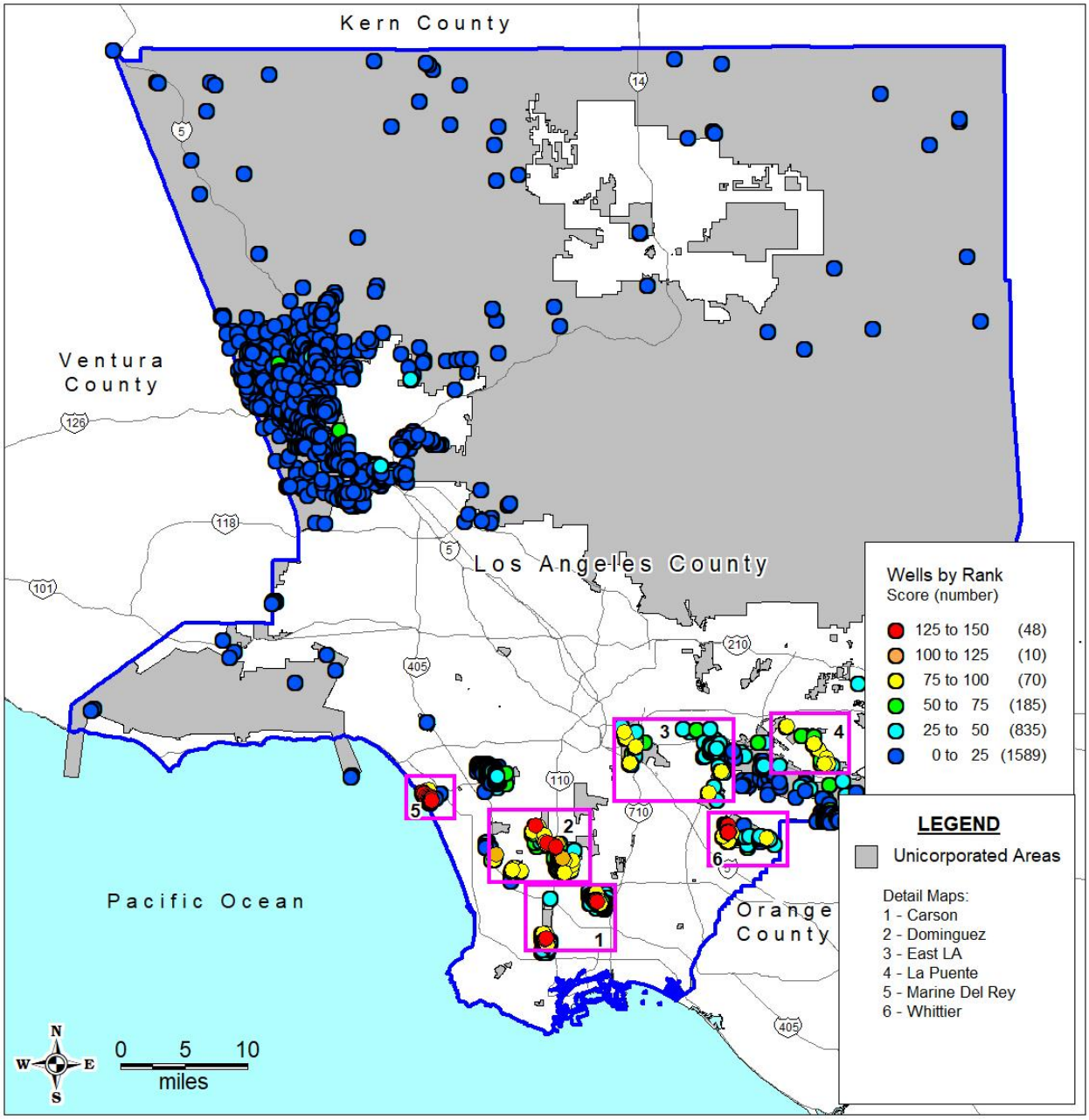


Figure 3-9 Wells by Ranking Score



NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.3 Detailed Review of Higher Priority Wells

The wells designated as higher priority were then reviewed in detail by obtaining the detailed files from CalGEM for each of the higher priority wells and reviewing the well records for the following items:

- Abandonment date.
- Blowouts or loss of well control occurrence.
- Any gas pressure encountered during drilling or gas production.
- Any crude oil encountered during drilling or any crude production history.
- Any gas encounter at depths less than 1,000 feet.
- Any recent leak testing conducted (in the last 20 years).

These factors were utilized to estimate the risks of well leakage of the higher priority wells. The results of this review are shown in the sections below. Note that any well, even a recently abandoned well to the most recent CalGEM standards, can still leak. The purpose of this exercise is to identify those wells that are at the highest risk of leaking - those wells abandoned when standards were lower; those wells that had gas present or caused problems during drilling; and those wells that have not been recently leak tested.

3.3.1 Abandonment Age

All of the well records had information on the abandonment procedures and abandonment date. The oldest well abandonment date was 1917 or over 100 years since abandonment. The years since abandonment are shown in the Table 3.11 below for the higher priority wells.

Table 3.11 Year Since Abandonment

Years since Abandonment	Number of Abandoned Wells
Less than 50 years	37
50 to 75 years	49
75 to 100 years	40
More than 100 years	2

Note: For high priority wells only.

CalGEM requirements related to abandonment have evolved over the years. Generally, wells abandoned prior to 1950s may have required a surface plug (cement poured into the hole) of generally 10 feet in thickness from the surface generally with some installation of cement "plugs" installed across and above the producing reservoir. Wells abandoned between 1950s and 1970s would have required thicker surface plugs, maybe 25 feet. Wells abandoned since the 1980 would have required surface plugs of 25 feet and cement plugs across all oil/gas reservoirs. Current abandonment requirements include 25 feet of a surface plug, cement plugs 100 feet across all producing reservoirs and a 100 to 200-foot cement plug across all groundwater zones and muds placed in all remaining spaces (CCR 1723).

3.3.2 Gas History

Wells that have a history of producing gas or showed periods of time during the well drilling process that "blew" gas, or flowed gas, would potentially exhibit a higher potential for leakage as gas located in the reservoir would be required to produce leakage at the surface. A well that did not exhibit any gas flow or pressures could still, subsequent to the well abandonment, become pressurized due to a shift in the formation geology or some other process, but would exhibit a significantly lower potential for gas leakage. Wells with gas history, no gas history, or wells not having any record and are therefore unknown are shown in Table 3.12 (along with other issues discussed below).

Table 3.12 High Priority Well Characteristics

Issue Area		Number of Abandoned Wells
Gas History	With gas history	62
	No gas history	33
	No records of gas history	33
Crude History	With crude history	67
	No crude history	43
	No records of crude history	18
Shallow Gas History	Yes	1
	No	127
Blowout History	Yes	4
	No	124
Recent Leak Test	Yes	11
	No	117

Note: For higher priority wells only. Note two wells did not have any data.

3.3.3 Crude History

Wells that have a history of producing crude oil or showed periods of time during the well drilling process that crude oil was produced, would potentially exhibit a higher potential for gas also being produced and therefore resulting in leakage of gas in the future. Wells with crude history, wells that have a record of no crude history, and the wells not having any record and are therefore unknown are shown in Table 3.12.

3.3.4 Shallow Gas History

Wells that have a history of producing gas or showed periods of time during the well drilling process that "blew" gas, or flowed gas, as well as having the gas zone be close to the surface, could potentially exhibit a higher potential for leakage as gas would have a shorter distance to reach the surface. Wells with shallow gas history are shown in Table 3.12.

3.3.5 Blowout History

Wells that have a history of producing gas in sufficient quantities from unstable formations to produce a blowout, or an uncontrolled release of the gas to the environment, could potentially exhibit a higher potential for leakage. Wells with blowout history are shown in Table 3.12.

3.3.6 Recent Leak Testing History

Wells that were recently excavated and leak tested and repaired to prevent leakage within the last 20 years, through the requirements associated with development, such as building structures in close proximity, would most likely have a lower propensity for leakage at this time since they were recently tested. It was assumed that all wells that were leak tested, if a leak was found, were repaired as per CalGEM requirements. Wells that were recently leak tested are shown in Table 3.12.

3.3.7 Abandoned Wells Refined Prioritization

Through the examination of the detailed well records from CalGEM for all the higher priority wells, some additional prioritization was developed. This prioritization was based on the propensity for an abandoned well to leak. The date of the abandonment influences the propensity for a well leaking as wells that were abandoned before 1970s would have less stringent abandonment procedures. Wells that exhibited some gas or some gas/oil presence in the reservoir also would have a higher propensity for leakage than a well which had not exhibited any hydrocarbons in the reservoir area during drilling. Wells, even if poorly abandoned, if they have no access to hydrocarbon, would not leak hydrocarbons. This does not mean that wells that exhibited no oil or gas could not change and shift over time as the geology changes, but that they would present a lower likelihood and frequency of leakage.

In addition, wells that exhibited shallow gas presence, meaning that the gas areas of the reservoirs were located close to the surface, could also present a greater propensity for leakage due to the short path lengths needed to reach the surface. And wells that had any history of a blowout would present a higher propensity for leakage due to the higher pressures and unstable nature of the reservoirs.

However, wells that have been recently leak tested (in the last 20 years) were assumed to present a lower risk for leakage.

The higher priority wells were segregated into Priority 1, Priority 2 and Priority 3 categories to define those which should be field-inspected first (Priority 1).

Wells classified as Priority 1 wells would be those wells meeting the following criteria:

- Abandoned more than 50 years ago with both gas and crude oil history.
- Abandoned more than 50 years ago with only gas history (no crude history).
- Any well with shallow gas.
- Any well that had a blowout history.

The wells classified a "Priority 2" including the following:

- Abandoned more than 75 years ago regardless of gas or crude history with a ranking of over 100.
- Abandoned more than 50 years ago with unknown gas or crude records with a ranking of over 100.

The wells classified a "Priority 3" including the following:

- Abandoned more than 75 years ago regardless of gas or crude history with a ranking below 100.
- Abandoned more than 50 years ago with unknown gas or crude records with a ranking below 100.

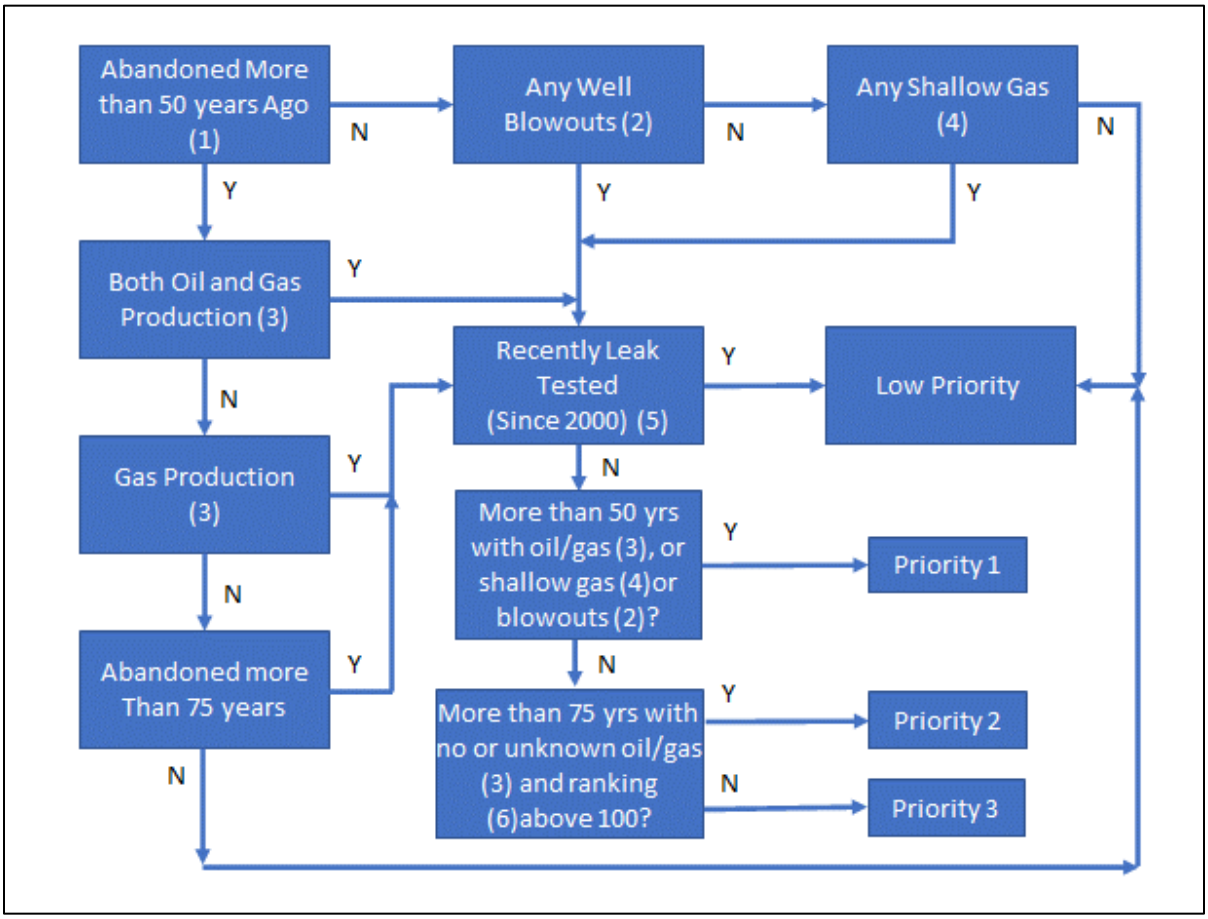
The wells breakdown is shown below. A flow chart of the well priority classification is shown in Figure 3-10.

Table 3.13 Wells Prioritization and Classification

Years	Number of Abandoned Wells	Number Percent	Cumulative	Cumulative Percent
Priority 1 inspection	43	34%	43	34%
Priority 2 inspection	13	10%	56	44%
Priority 3 inspection	25	20%	81	63%
Low priority for inspection	47	37%	128	100%

Note: For high priority wells only

Figure 3-10 Well Inspection Prioritization Flowchart



Notes: numbers correlate with the table below.

Detailed maps of high priority wells and the priority classifications are shown in Attachment D. Table 3.14 lists the highest-ranking wells and their corresponding classifications. A Draft Abandoned Well Inspection Protocol was developed for the field inspections and is included as Appendix E. Appendix F contains the inspection sheets for each well, including all the available historical data from CalGEM, and the mapped locations.

Table 3.14 Highest Ranking Wells

Well API	Well APN/ AIN*	Field	Rank (6)	Abandoned Age, years (1)	Blowouts? (2)	Any gas? (3)	Any oil? (3)	Any gas at <1000' (4)	Recent Leak Test? (5)	Priority Class
0403723481	6059009024	Howard Townsite	143	26	none	yes	yes	N	N	Low
0403723499	6059009024	Howard Townsite	143	27	none	yes	yes	N	N	Low
0403723558	6059009024	Howard Townsite	143	27	none	yes	no	N	N	Low
0403714401	6089012023	Rosecrans	140	71	none	yes	yes	N	N	Priority 1
0403714457	6132019038	Rosecrans	140	91	none	yes	yes	N	N	Priority 1
0403714461	6132019034	Rosecrans	140	94	none	yes	yes	N	N	Priority 1
0403706750	7318010025	Dominguez	132	94	none	UN	yes	N	N	Priority 1
0403706802	7318010025	Dominguez	132	93	none	yes	yes	N	N	Priority 1

Table 3.14 Highest Ranking Wells

Well API	Well APN/ AIN*	Field	Rank (6)	Abandoned Age, years (1)	Blowouts? (2)	Any gas? (3)	Any oil? (3)	Any gas at <1000' (4)	Recent Leak Test? (5)	Priority Class
0403706918	7318010025	Dominguez	132	103	none	no	no	N	N	Priority 2
0403707304	7318010025	Dominguez	132	17	none	yes	yes	N	N	Low
0403707306	7318010025	Dominguez	132	19	none	UN	yes	N	Y	Low
0403707547	7318010025	Dominguez	132	66	none	yes	yes	N	N	Priority 1
0403723487	6059009024	Howard Townsite	132	27	none	yes	yes	N	N	Low
0403713797	4224002900	Playa Del Rey	130	61	none	UN	UN	N	N	Priority 2
0403713798	4224002900	Playa Del Rey	130	2	Yes	yes	no	N	N	Low
0403713802	4224005910	Playa Del Rey	130	61	none	yes	yes	N	N	Priority 1
0403713805	4224005903	Playa Del Rey	130	9	none	yes	yes	N	N	Low
0403713806	4224005903	Playa Del Rey	130	9	none	UN	yes	N	N	Low
0403713807	4224001904	Playa Del Rey	130	61	none	UN	UN	N	N	Priority 2
0403713808	4224001904	Playa Del Rey	130	61	none	yes	yes	N	N	Priority 1
0403713809	4224002900	Playa Del Rey	130	61	none	yes	yes	N	N	Priority 1
0403713810	4224002900	Playa Del Rey	130	61	none	UN	yes	N	N	Priority 2
0403713811	4224002900	Playa Del Rey	130	61	none	yes	yes	N	Y	Low
0403713812	4224002900	Playa Del Rey	130	61	none	yes	yes	N	N	Priority 1
0403713813	4224002900	Playa Del Rey	130	61	none	UN	yes	N	N	Priority 2
0403713815	4224002900	Playa Del Rey	130	61	none	UN	UN	N	N	Priority 2
0403713816	4224001904	Playa Del Rey	130	61	none	yes	yes	N	N	Priority 2
0403714011	4224001904	Playa Del Rey	130	51	none	yes	yes	N	N	Priority 2
0403714012	4224001904	Playa Del Rey	130	51	none	yes	yes	N	N	Priority 2
0403714013	4224001904	Playa Del Rey	130	51	none	yes	yes	N	N	Priority 2
0403714015	4224001800	Playa Del Rey	130	8	none	yes	yes	N	N	Low
0403709003	8011010021	Santa Fe Springs	126	64	none	yes	yes	N	N	Priority 1
0403713572	6132019019	Rosecrans	126	93	Yes	yes	UN	N	N	Priority 1
0403714838	8011011003	Santa Fe Springs	126	79	none	UN	yes	N	N	Priority 1
0403714842	8011009059	Santa Fe Springs	126	24	none	no	no	N	Y	Low
0403715037	6132019013	Rosecrans	126	66	Yes	yes	UN	N	N	Priority 1
0403715764	8011009011	Santa Fe Springs	126	26	none	UN	UN	N	N	Low
0403716093	8011009059	Santa Fe Springs	126	26	none	UN	UN	N	Y	Low
0403716370	8157026019	Santa Fe Springs	126	93	none	no	yes	N	N	Priority 2
0403716371	8157026011	Santa Fe Springs	126	89	none	no	no	N	N	Priority 2
0403716372	8029016005	Santa Fe Springs	126	73	none	UN	UN	N	N	Priority 1
0403716435	8011009059	Santa Fe Springs	126	26	none	UN	yes	N	Y	Low
0403716700	8029016022	Santa Fe Springs	126	94	none	yes	yes	N	N	Priority 1
0403716701	8011009932	Santa Fe Springs	126	26	none	UN	yes	N	Y	Low
0403716706	8011009934	Santa Fe Springs	126	26	none	yes	UN	N	Y	Low
0403718469	7407031223	Torrance	126	82	none	UN	yes	N	N	Priority 1
0403718471	7407031223	Torrance	126	82	none	yes	yes	N	N	Priority 1
0403718485	7407031066	Torrance	126	38	none	UN	yes	N	N	Low
0403707305	7318010025	Dominguez	121	16	none	yes	yes	N	N	Low
0403710651	6131016047	Rosecrans	121	16	none	yes	yes	N	N	Low

Table 3.14 Highest Ranking Wells

Well API	Well APN/ AIN*	Field	Rank (6)	Abandoned Age, years (1)	Blowouts? (2)	Any gas? (3)	Any oil? (3)	Any gas at <1000' (4)	Recent Leak Test? (5)	Priority Class
0403713641	6131010004	Rosecrans	121	66	none	UN	yes	N	N	Priority 1
0403714488	6131016013	Rosecrans	121	88	none	yes	yes	N	N	Priority 1
0403714982	6131009045	Rosecrans	121	88	none	yes	yes	N	N	Priority 1
0403707642	6089003006	Howard Townsite	112	95	none	yes	no	N	N	Priority 1
0403705329	6132032001	NS	110	77	none	yes	no	Y	N	Priority 1
0403708628	4147004014	Lawndale	110	74	none	no	no	N	N	Low
0403708589	4147021018	Lawndale	100	91	none	no	no	N	N	Priority 3
0403708594	4147023005	Lawndale	100	89	none	yes	yes	N	Y	Low
0403706757	7318008026	Dominguez	99	86	none	UN	UN	N	N	Priority 3
0403716883	7344018023	Torrance	99	74	none	UN	UN	N	N	Priority 1
0403717819	7344020024	Torrance	99	5	none	UN	yes	N	N	Low
0403718486	7407018044	Torrance	99	46	none	UN	yes	N	N	Priority 3
0403718487	7407018051	Torrance	99	46	none	UN	yes	N	N	Priority 3
0403718488	7407015088	Torrance	99	32	none	UN	UN	N	N	Low
0403725134	7407018045	Torrance	99	33	none	no	no	N	N	Low
0403705152	5232027021	NS	98	74	none	no	no	N	N	Low
0403705166	8728009007	NS	98	66	none	no	no	N	N	Low
0403705171	8728008002	NS	98	66	none	no	no	N	N	Low
0403705596	8028007003	NS	98	95	none	no	no	N	N	Priority 3
0403706039	5236020026	NS	98	90	none	no	no	N	N	Priority 3
0403706135	5231010018	NS	98	101	none	yes	no	N	N	Priority 1
0403705167	8728013033	NS	91	71	none	UN	yes	N	N	Priority 3
0403705170	8728020013	NS	91	66	none	no	no	N	N	Low
0403705736	6139026013	NS	91	63	none	yes	no	N	N	Priority 1
0403715519	8026004009	Santa Fe Springs	90	96	none	UN	UN	N	N	Priority 3
0403718472	7407023028	Torrance	90	54	none	yes	yes	N	N	Priority 3
0403700802	4073014013	Alondra	88	44	none	yes	yes	N	N	Low
0403700803	4070015003	Alondra	88	72	none	yes	no	N	N	Priority 1
0403707638	6079004901	Howard Townsite	88	55	none	yes	no	N	N	Priority 1
0403707650	6079004901	Howard Townsite	88	95	none	UN	UN	N	N	Priority 1
0403720682	6079005015	Howard Townsite	88	51	none	no	no	N	Y	Low
0403700838	5241022022	Bandini	84	63	none	yes	no	N	N	Priority 1
0403705644	6059014003	NS	84	89	none	no	no	N	N	Priority 3
0403706182	8029012014	NS	84	97	none	no	no	N	N	Priority 3
0403714370	6137018013	NS	84	95	none	no	no	N	N	Priority 3
0403714418	6132019046	Rosecrans	84	89	none	yes	yes	N	N	Priority 1
0403714592	6125007030	Rosecrans, South	84	67	none	no	no	N	N	Low
0403718922	8129013038	Whittier	84	99	none	no	no	N	N	Priority 3
0403717759	7409012009	Torrance	81	56	none	yes	yes	N	N	Priority 3
0403717772	7409011031	Torrance	81	56	none	yes	yes	N	N	Priority 3
0403718483	7407027027	Torrance	81	54	none	UN	UN	N	N	Priority 3
0403718484	7407027036	Torrance	81	54	none	UN	UN	N	N	Priority 3
0403700042	4073024001	Alondra	80	73	none	no	no	N	N	Low
0403700801	4070016004	Alondra	80	63	none	yes	yes	N	N	Priority 1
0403700804	4070012030	Alondra	80	84	none	yes	no	N	N	Priority 1
0403702080	4073017012	Alondra	80	44	none	yes	yes	N	N	Low
0403705602	6077008021	Howard Townsite	80	79	none	no	no	N	N	Priority 1
0403707374	6078018004	Howard Townsite	80	94	none	no	no	N	N	Priority 3
0403707375	6078008024	Howard Townsite	80	74	none	yes	yes	N	N	Priority 1
0403707635	6089014029	Howard Townsite	80	14	none	yes	yes	N	Y	Low
0403708665	8040020024	Leffingwell	80	50	none	yes	yes	N	N	Priority 3
0403713804	4224004900	Playa Del Rey	78	61	none	no	no	N	N	Low
0403705149	6077017028	NS	77	94	none	no	no	N	N	Priority 3
0403705340	8262002024	NS	77	87	none	no	no	N	N	Priority 3

Table 3.14 Highest Ranking Wells

Well API	Well APN/ AIN*	Field	Rank (6)	Abandoned Age, years (1)	Blowouts? (2)	Any gas? (3)	Any oil? (3)	Any gas at <1000' (4)	Recent Leak Test? (5)	Priority Class
0403705600	6077022009	NS	77	79	Yes	yes	no	N	N	Priority 1
0403705757	8745006013	NS	77	69	none	UN	UN	N	N	Priority 3
0403705758	8745007017	NS	77	69	none	no	no	N	N	Low
0403705832	6137014012	NS	77	93	none	no	no	N	N	Priority 3
0403705963	8176023030	NS	77	95	none	no	no	N	N	Priority 3
0403706149	8026028037	NS	77	95	none	yes	no	N	N	Priority 1
0403706152	8465018015	NS	77	84	none	no	no	N	N	Low
0403706166	6077017015	NS	77	100	none	no	no	N	N	Priority 3
0403706751	7318010025	Dominguez	77	36	none	yes	yes	N	N	Low
0403706752	7318022030	Dominguez	77	36	none	no	yes	N	N	Low
0403706767	7318022029	Dominguez	77	36	none	no	no	N	N	Low
0403706778	7318022030	Dominguez	77	36	none	no	no	N	N	Low
0403706801	7318010270	Dominguez	77	73	none	UN	yes	N	N	Priority 1
0403706803	7318010270	Dominguez	77	69	none	UN	yes	N	N	Priority 3
0403706804	7318010027	Dominguez	77	73	none	yes	yes	N	N	Priority 1
0403706805	7318022012	Dominguez	77	36	none	yes	yes	N	N	Low
0403707301	7318023028	Dominguez	77	21	none	yes	yes	N	Y	Low
0403707302	7318010026	Dominguez	77	17	none	yes	yes	N	N	Low
0403707303	7318010025	Dominguez	77	17	none	yes	yes	N	N	Low
0403707546	7318023050	Dominguez	77	35	none	yes	yes	N	N	Low
0403707552	7318022012	Dominguez	77	72	none	UN	yes	N	N	Priority 1
0403714493	6131018010	Rosecrans	77	57	none	yes	yes	N	N	Priority 1
0403714986	6131018032	Rosecrans	77	88	none	yes	yes	N	N	Priority 1
0403715031	6131014025	Rosecrans	77	94	none	UN	UN	N	N	Priority 1

* APN/AIN shows the parcel that the well is located within or, for those wells located within street ROWs, the closest parcel APN/AIN.
UN=unknown, NS= Not Specified

3.4 Idle Wells

The CalGEM database of wells also includes idle wells. Idle wells are those wells that have historically not been recorded as having been plugged and abandoned and are not currently operating and producing oil/gas. Many idle wells are associated with a producing field and for a number of reasons have not produced oil/gas recently but are managed by an operator. However, some idle wells may have just been left and potentially buried by a previous operator, and not properly abandoned. Wells that have not been properly plugged and abandoned, and are not being actively managed, can present a potential risk to the public or environment if they are associated with reservoirs that have some potential for gas production.

CalGEM has an Idle Well Management Program (IWMP) to address this potential concern. An idle well is defined by CalGEM as a well that has not been used for two years or more and has not yet been properly plugged and abandoned. Reporting shows there are approximately 35,000 wells in California categorized as idle. Idle wells that have been idle for more than 8 years are considered Long Term Idle Wells (LTIW).

CalGEM regulations require idle wells to be tested including a fluid level test and casing pressure test and, if necessary, repaired, or permanently plugged and abandoned. However, there are many idle wells that are not part of a management program since in some cases the operator no longer exists. The CalGEM IWMP program provides incentives to operators to abandon long-idle wells, as well as providing funding for CalGEM to contract to abandon wells themselves and paid for as part of fees deposited into the Hazardous and Idle-Deserted Well Abatement Fund.

Idle wells in the CalGEM IWMP database shows a total of 622 idle wells located in the unincorporated areas of Los Angeles County (note this is different than the number listed in Section 3.2 as the IWMP database is from a different date).

The idle wells in the unincorporated area of Los Angeles County in the CalGEM database were prioritized based on their potential impact to public health and safety related to the potential for leakage of gas to the surface. Wells were prioritized based on the following characteristics:

- Years the well has been idle;
- Well location and census block population density and ranking;
- Reservoir characteristics and ranking; and
- Inclusion of the well in an active IWMP that includes testing of the well.

Each of these along with the prioritization method are discussed below.

3.4.1 Idle Well Years Idle

Table 3.15 shows the idle wells categorized by the years the well has been idle. Generally, the longer a well has been idle, the greater the probability of the well not being in a condition that would prevent the passage of gas to the surface and also increases the probability that the well was idled in a manner that increases the public safety risks. Note that many wells are not considered long-term idle wells and are probably part of an actively managed oil field. However, there are some wells that have been idle for more than 100 years.

Table 3.15 Idle Wells in the Los Angeles County Incorporated Area, by Years Idle

Years Idle	Number	"Years Idle" Rank
not LTIW (<8 years)	244	0
Idle 8 - 19 years	166	1
Idle 20 – 39 years	126	2
Idle 40 – 59 years	59	3
Idle 60 – 79 years	4	4
Idle 80 – 99 years	12	5
Idle >= 100 years	11	6
Total wells	**622**	

Source: CalGEM IWMP database 1/2020.
Notes: Idle wells defined by CalGEM as a well that has not been used for two years or more and has not yet been "plugged and abandoned" per CalGEM requirements. Long Term Idle Wells (LTIW) are those wells idle for more than 8 years.

3.4.2 Idle Well Reservoir Characteristics

Table 3.16 shows the idle wells categorized by the reservoir in which they are located. As discussed in sections above related to abandoned wells, a reservoir that has not historically generated gas or

has very low pressures would produce a lower risk for leakage of gas to the surface. Note that most of the idle wells are located in higher ranking reservoirs.

Table 3.16 Idle Wells in the Los Angeles County Incorporated Area, by Reservoir Ranking

Reservoir Rank	Number
Less Than 4 ranking	40
4-6 ranking	160
6-8 ranking	142
8-10 ranking	280
Total wells	**622**

Source: CalGEM May 2019.
Notes: Reservoir ranking is defined in previous sections.

3.4.3 Idle Well Population Density

Table 3.17 shows the idle wells categorized by the density of the population of the area in which the idle well is located. Highly urban areas with high population densities increase the risk of a leaking well impacting a receptor. A well located in a rural area with no populations nearby does not present as much risk. Note that most of the idle wells are located in rural, low density areas in north County areas.

Table 3.17 Idle Wells in the Los Angeles County Incorporated Area, by Population Density

Population Density	Number	Population Density Rank
PPSM = 0 - 999	305	0
PPSM = 1,000 – 1,999	24	1
PPSM = 2,000 – 3,999	21	2
PPSM = 4,000 – 5,999	13	3
PPSM = 6,000 – 7,999	12	4
PPSM = 8,000 – 9,999	9	5
PPSM = 10,000 – 11,999	5	6
PPSM = 12,000 – 13,999	1	7
PPSM = 14,000 – 15,999	9	8
PPSM = 16,000 – 17,999	0	9
PPSM greater than 18,000	1	10
Total wells	**622**	

Source: CalGEM May 2019.
Notes: Population density is defined by the census block group that the idle well is located within and is persons per square mile (PPSM).

3.4.4 Idle Well Management Program Wells

Information was obtained from CalGEM on the highest priority wells that are also a part of an IWMP and therefore are subject to regular testing and maintenance. These idle wells would present

less risk because they are regularly tested and maintained. A total of 24 of the highest ranking 75 wells are currently part of an IWMP and are tested regularly.

3.4.5 Idle Well Ranking

The ranking system for idle wells is based on the reservoir rank and the "years idle" rank. These two ranks are then combined with the population density rank and whether the wells are part of an IWMP. The following approach was used:

Idle Well Rank = (Reservoir Rank + Years Idle Rank) x Population Density Rank

This ranking scheme allows for a lower ranking for wells that are located in low population density areas, which would generally produce lower impacts if a well is found to be leaking. In addition, this ranking scheme takes into account wells that are part of the IWMP and are actively being tested and managed and therefore would have a lower probability of leaking.

Table 3.18 shows the results of the ranking. Figure 3-11 below shows the location of the wells and their associated rankings. Most of the wells are ranked low as they are located in low population density areas. However, there are 35 wells which are ranked above 20 (higher priority) and these are listed in Table 3.19.

Table 3.18 Idle Wells in the Los Angeles County Incorporated Area, by Reservoir Ranking

Idle Well Rank	Number
Rating Less Than 20	587
Rating 20-39	15
Rating 40-59	11
Rating 60-79	6
Rating >= 80	3
Total wells	**622**

Source: CalGEM May 2019.
Notes: Ranking scheme is defined as rank = (Reservoir Rank + Years Idle Rank) x Population Density Rank. Wells part of an IWMP are ranked = 0.

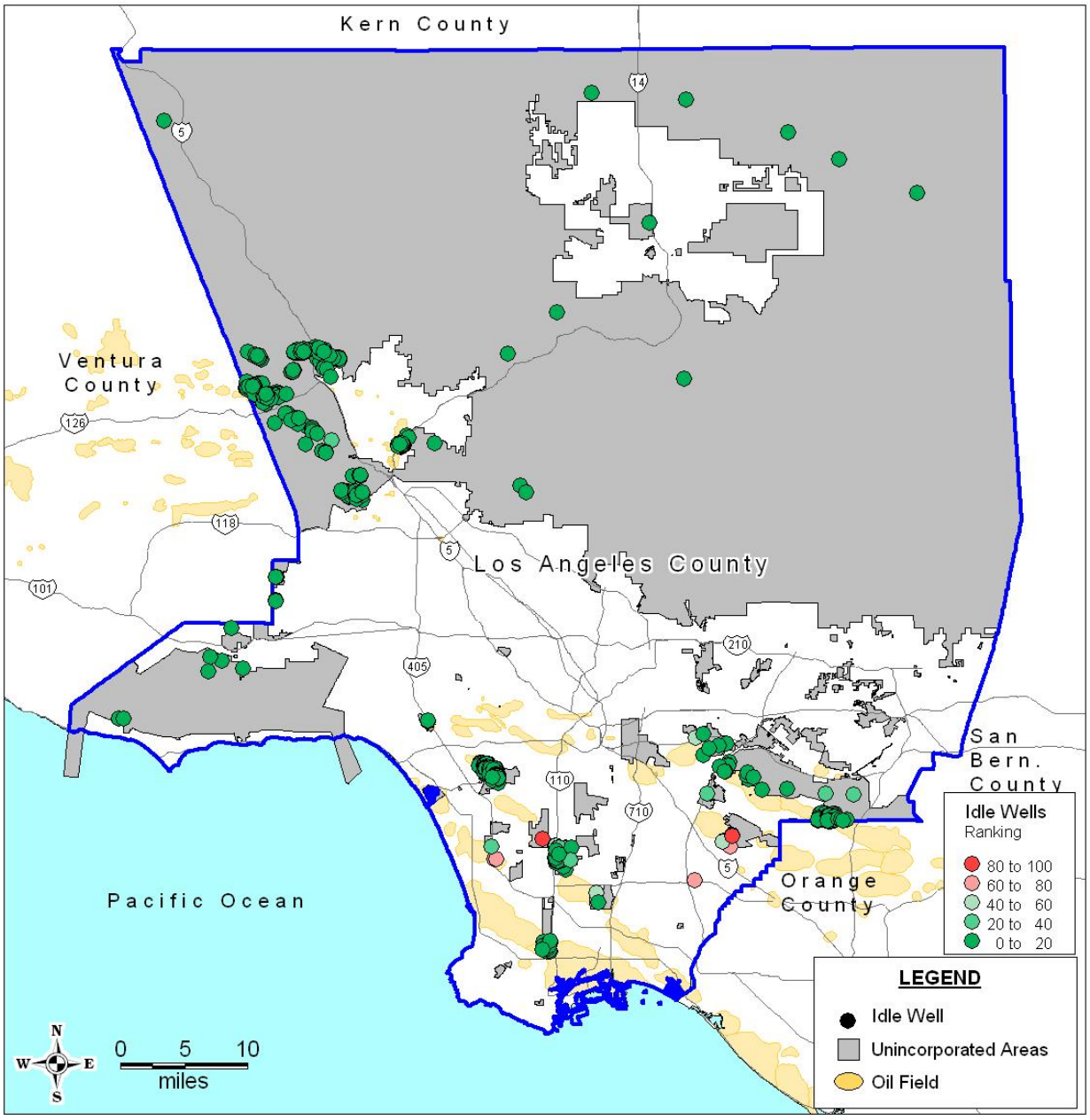
Table 3.19 Highest Ranked Idle Wells

Well API	Idle Years	Reservoir Rank	Population Density, ppsm	IWMP?	Ranking
0403705142	91	5	12,074	No	70
0403705199	18	5	10,479	No	36
0403705223	18	5	14,379	No	48
0403705224	18	5	14,767	No	48
0403705440	79	5	7,701	No	36
0403705461	76	5	4,719	No	27
0403705466	76	5	8,556	No	45
0403705525	14	5	7,545	No	24
0403705555	90	5	10,449	No	60
0403705557	86	5	11,511	No	60

Table 3.19 Highest Ranked Idle Wells

Well API	Idle Years	Reservoir Rank	Population Density, ppsm	IWMP?	Ranking
0403705820	14	5	7,325	No	24
0403705844	14	5	14,379	No	48
0403705845	14	5	14,379	No	48
0403705953	97	5	2,898	No	20
0403706131	10	5	15,056	No	48
0403706132	10	5	15,056	No	48
0403706180	109	5	14,328	No	88
0403706181	109	5	14,328	No	88
0403706744	41	8	7,686	No	44
0403707634	75	5	21,803	No	90
0403708606	14	7	14,392	No	64
0403708607	86	7	10,142	No	72
0403712029	14	6	5,980	No	21
0403712816	29	5	6,494	No	28
0403713573	14	8	10,479	No	54
0403713584	14	8	8,919	No	45
0403713588	92	8	9,196	No	65
0403714385	14	8	9,196	No	45
0403714989	2	8	4,817	No	24
0403716951	8	7	5,043	No	24
0403717641	7	7	8,791	No	35
0403717644	1	7	7,618	No	28
0403718001	11	7	7,618	No	32
0403726385	100	5	4,755	No	33
0403726877	11	9	2,812	No	20

Figure 3-11 Idle Wells Ranking



Source: CalGEM May 2019.

3.5 Well Inspection Protocol

The Strike Team field inspection of priority wells was delayed by the COVID-19 pandemic and the associated State and local stay at home/lockdown orders. During this period, in preparation for the inspection efforts, the priority wells were reviewed for available data and the well inspection protocol sheets were completed for the items not requiring a field visit to document. In addition, this process was also completed for the highest ranking idle wells. Data compiled for these wells include the following:

- Well identification (name, API number, CalGEM well status;
- Well history (original spud date, blowout history, abandonment or idle date)
- Well site property assessor parcel number;
- Nearest address;
- Nearest residence;
- Nearest school;
- Nearby sensitive receptors;
- List of other wells or oil and gas infrastructure in the area; and
- Maps and or aerial imagery.

Figures 3-12 through 3-16 provide an example of the inspection protocol sheet and maps developed for the field inspections. Inspection sheets for all the high priority abandoned and idle wells are included in Appendix F and G, respectively.

Leaking abandoned or idle wells can be difficult to identify as there may not be any above the ground infrastructure remaining. The inspection protocol utilized a handheld RKI GX6000 air quality monitor as well as a FLIR camera, both of which will help to identify any leaks in the area of the abandoned/idle well. A FLIR camera allows for visualizing leaking methane plumes and allows for surveying a wide area instantly and easily. The handheld monitor allows for identifying exact concentrations and compositions of leakages if they are identified. See discussion on inspections below.

The site inspection protocol involves the following activities:

- Interviewing neighbors;
- Attempting to locate well identifiers;
- Surveying the area with FLIR camera and recording video of the survey;
- Surveying the area with a handheld air monitor and recording any contaminants;
- Recording pictures of the area; and
- Recording GIS data of the locations.

Figure 3-12 Example - Abandoned Well Inspection Protocol Sheet

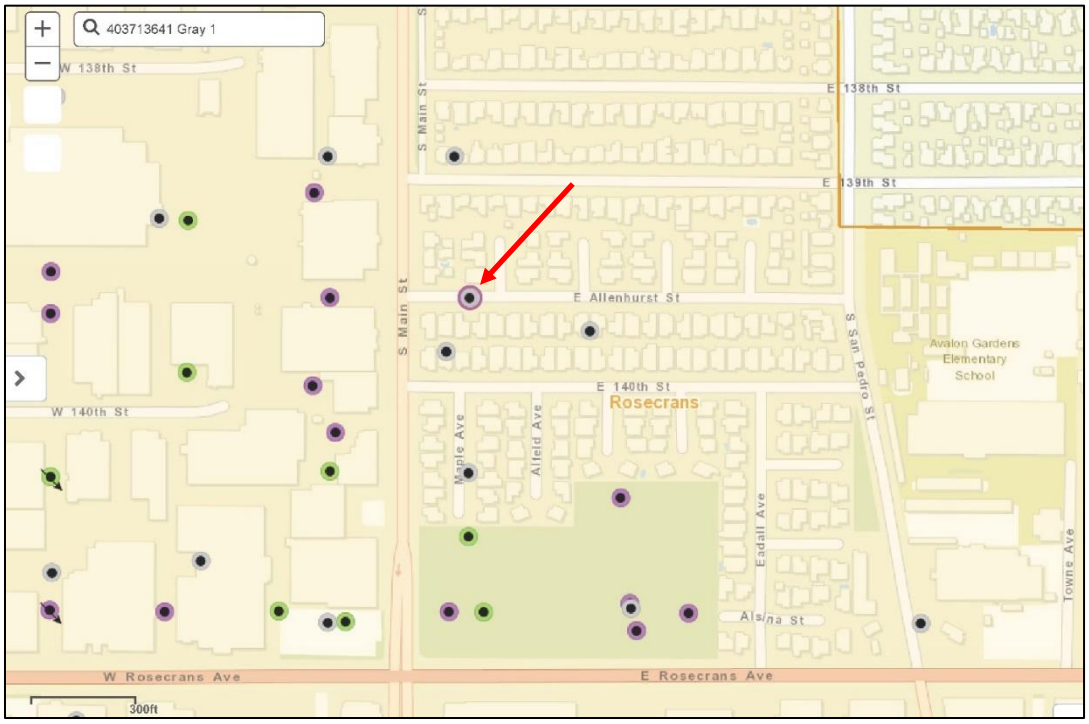
LA County Oil and Gas Facility Compliance Review Project
Abandoned/Idle Well Inspection Protocol

CalGEM Records Review Summary			
Well API	403713641	Original Spud Date	9/16/1925
Well Risk Ranking	121	Blowout History?	None
Well Name	Gray 1	Gas or Gas Production?	UN
Abandonment Date	1/27/1954	Well Type? Producer or Injector	Oil & Gas
Years Since Abandonment	66	Well Finder Status	Plugged
CalGEM Location Data?	200' East of Main Street		
• Attach CalGEM Maps • Attach Other Agency Records			
Well Location Detail			
APN	3131010004		
Property Contact Information			
Nearest Address	116 East Allenhurst Street, Los Angeles, CA 90061		
Nearest Cross Street(s)	East Allenhurst and South Main Street		
Land Use Type	Residential		
Nearest Residence	116 East Allenhurst Street (~50 feet)		
Nearest School	Avalon Gardens Elementary School (~1,200 feet)		
Other Sensitive Receptor	Residences		
Wells in Area? Type of Well?	403714431 (Idle) 403710651 (plugged) 403714488 (plugged)		
Active Oil and Gas Equip?	No		
• Attach Location Map from WellSTAR • Attach Google Earth Map • Attach Google Earth Image • Attach Site Photographs			
Well Inspection			
Inspection Date		Inspectors	
Is Well Visible?			
Surface Description			
Surrounding Area Land Use			
Any Signage?			
Fencing?			
Cone system?			
Notes			

Air Quality/Odor Monitoring					
Location	FLIR Camera		RKI GSX - 6000		
	CH4	VOC	CH4	VOC	H2S

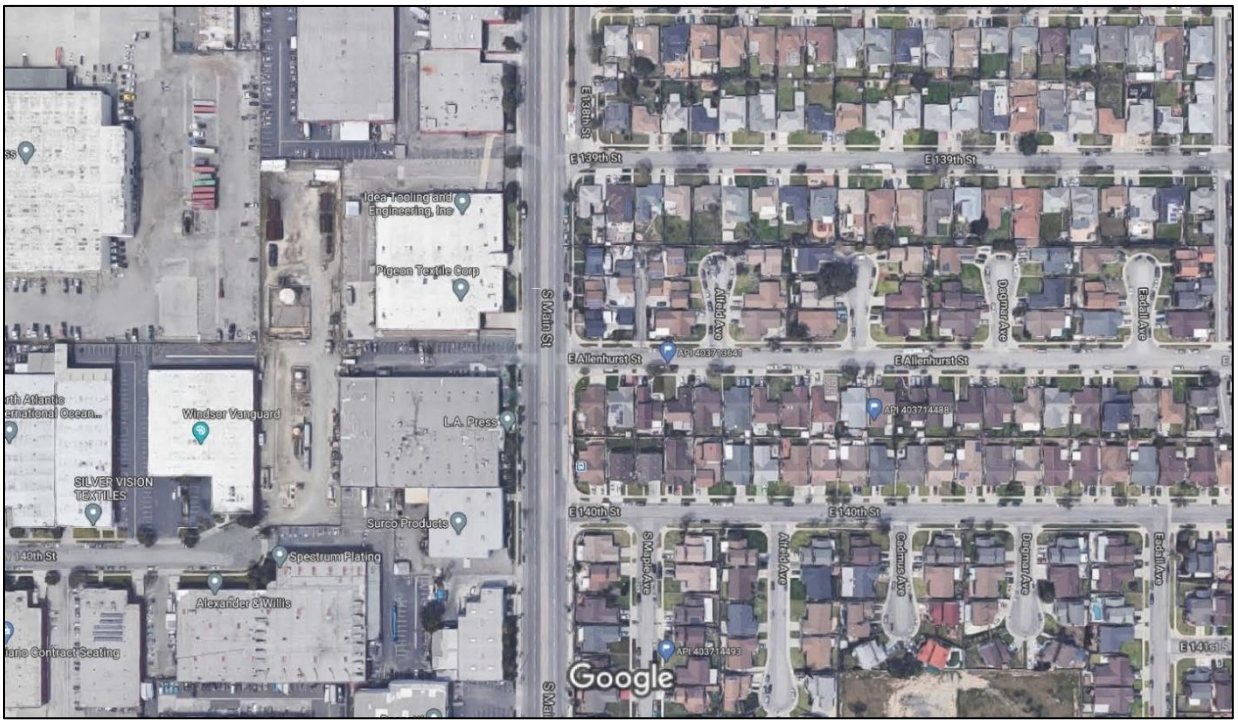
Neighborhood Interviews	
Name/Contact Info	Comment(s)

Figure 3-13 Example CalGEM Well Finder/Star Map for Well Gray 1



Source: CalGEM Well Finder January 2021.

Figure 3-14 Example Google Aerial Overview for Well Inspection Protocol Sheet



Source: Google Earth January 2021

Figure 3-15 Example Google Aerial Street for Well Inspection Protocol Sheet

Source: Google Earth January 2021

Figure 3-16 Example Google Street View for Well Inspection Protocol Sheet

Source: Google January 2021

3.6 Well Inspections

In-field inspections of the high priority abandoned, and idle wells were completed over three days from June 15 through June 17, 2021. The purpose of the in-field inspections was to identify if any of the wells may be leaking to the surface at the time of the in-field inspection through the use of gas-detection monitors; to interview residents in the area around the wells to determine if any well-related issues had been observed; and to identify if the wells could be positively identified at the locations designated in the CalGEM databases.

The inspection effort utilized the locations of the wells based on the information in the CalGEM database as a starting point for surveying the area with gas detection monitors as well as discussing with residents if any issues have been experienced. Because the locations of the wells in the CalGEM database are sometimes inaccurate, an area encompassing multiple parcels, ranging from 50-150 feet from the CalGEM identified well location, was surveyed. In general, most wells were expected to be buried and inaccessible.

Three different well types were identified and mapped, including the highest priority abandoned wells (priority 1), high priority idle wells and lower priority abandoned wells (priorities 2 and 3) that were located in the vicinity of the high priority wells.

3.6.1 Well Inspection Team

The inspection team consisted of staff from the Strike Team participating agencies along with staff from MRS Environmental. The inspection team members are listed in Table 3.20 below.

Table 3.20 Inspection Team

Name	Agency
Diana Gonzalez	County Department of Regional Planning
Edgar De La Torre	County Department of Regional Planning
Alex Garcia	County Department of Regional Planning
Ed Gerlits	County Department of Public Works
Evenor Masis	County Department of Public Health
Nicholas Beliajev	County Fire Department
Celina Chang	California Geologic Energy Management Division (CalGEM)
Adam Tavasolian	South Coast Air Quality Management District (SCAQMD)
Adam Taing	Regional Water Quality Control Waterboard (RWQCB)
Greg Chittick	MRS Environmental
Dean Dusette	MRS Environmental
Nicole Trezza	MRS Environmental

Note: Not all inspection team members attended all three days of the inspection program.

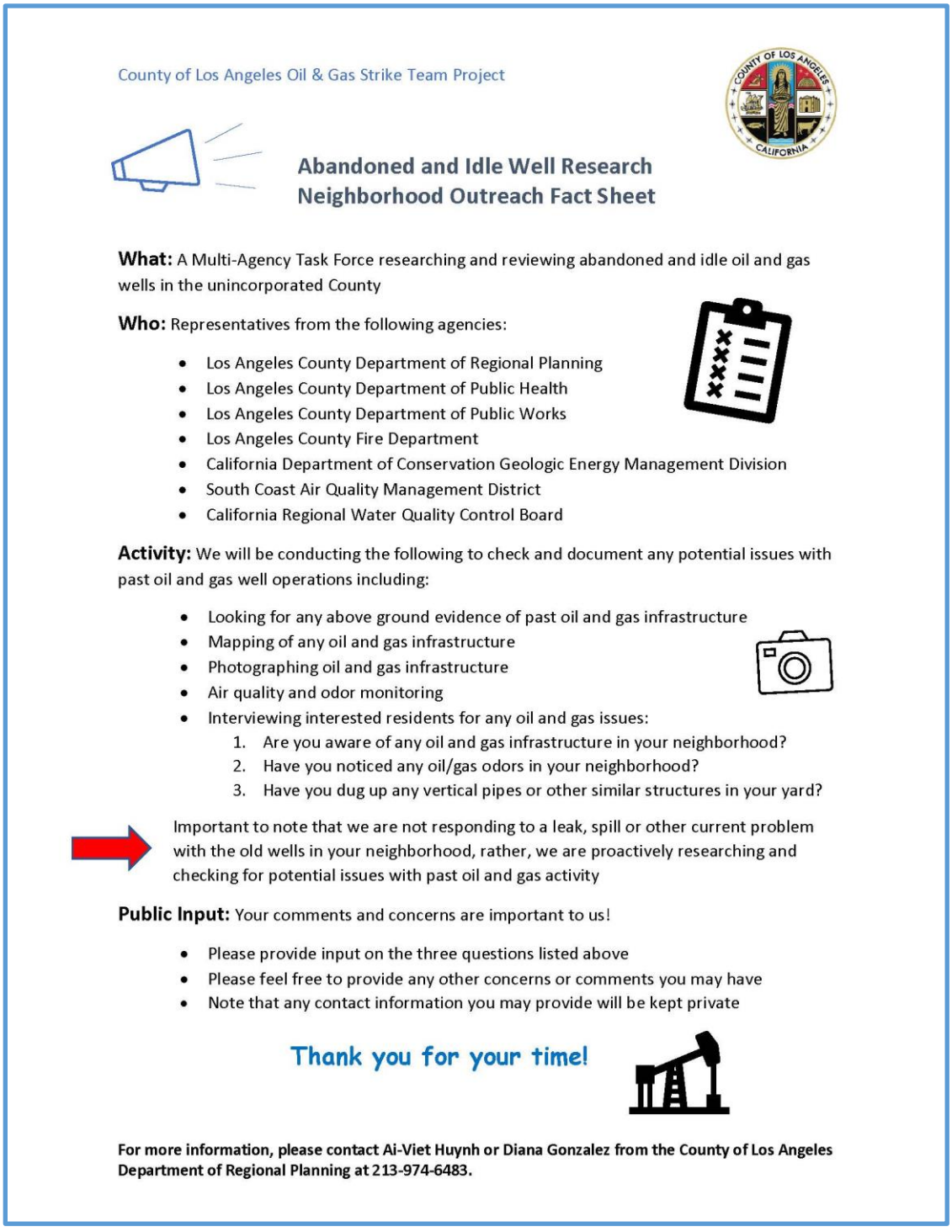
3.6.2 Well Inspection Public Outreach

The inspection team used three basic questions as a guide when talking with the public during a visit to a well location to try to ascertain if neighbors were aware of wells in the area or if they had witnessed any evidence of the presence of wells in the area:

- Are you aware of any oil and gas infrastructure in your neighborhood?
- Have you noticed any oil/gas odors in your neighborhood?
- Have you dug up any vertical pipes or other similar structures in your yard?

These three questions formed the basic discussion with members of the public; however, they were encouraged to provide any other input or concerns about having an abandoned or idle well in their neighborhood. The inspection team included staff fluent in Spanish. An information flyer was also used during the inspection as additional outreach to the public that included Department of Regional Planning contact information for those wishing to provide any follow up information. The flyer, which was also provided in Spanish on the reverse side, is included below in Figure 3-17.

Figure 3-17 Abandoned and Idle Well Research Neighborhood Outreach Fact Sheet



County of Los Angeles Oil & Gas Strike Team Project

Abandoned and Idle Well Research Neighborhood Outreach Fact Sheet

What: A Multi-Agency Task Force researching and reviewing abandoned and idle oil and gas wells in the unincorporated County

Who: Representatives from the following agencies:

- Los Angeles County Department of Regional Planning
- Los Angeles County Department of Public Health
- Los Angeles County Department of Public Works
- Los Angeles County Fire Department
- California Department of Conservation Geologic Energy Management Division
- South Coast Air Quality Management District
- California Regional Water Quality Control Board

Activity: We will be conducting the following to check and document any potential issues with past oil and gas well operations including:

- Looking for any above ground evidence of past oil and gas infrastructure
- Mapping of any oil and gas infrastructure
- Photographing oil and gas infrastructure
- Air quality and odor monitoring
- Interviewing interested residents for any oil and gas issues:
  1. Are you aware of any oil and gas infrastructure in your neighborhood?
  2. Have you noticed any oil/gas odors in your neighborhood?
  3. Have you dug up any vertical pipes or other similar structures in your yard?

Important to note that we are not responding to a leak, spill or other current problem with the old wells in your neighborhood, rather, we are proactively researching and checking for potential issues with past oil and gas activity

Public Input: Your comments and concerns are important to us!

- Please provide input on the three questions listed above
- Please feel free to provide any other concerns or comments you may have
- Note that any contact information you may provide will be kept private

Thank you for your time!

For more information, please contact Ai-Viet Huynh or Diana Gonzalez from the County of Los Angeles Department of Regional Planning at 213-974-6483.

3.6.3 Gas Monitoring

The inspection effort included monitoring for gas/odors/vapors utilizing three different gas monitors as listed in Table 3.21 below.

Table 3.21 Air Quality Monitoring Instrumentation

Monitoring Device	Gas Detection		Agency
RKI GX-6000 Multi Gas Monitor	Methane	Oxygen	MRS Environmental
	Hydrogen Sulfide	Carbon Monoxide	
	VOCs		
FLIR GFX 320 Optimal Gas Imaging Camera	Methanol	Methane	SCAQMD CalGEM (2 Cameras)
	Benzene	Ethane	
	Propylene	Ethanol	
	Pentane	1-Pentene	
	Isoprene	Butane	
	Ethylbenzene	MEK	
	Toluene	Propane	
	Octane	Heptane	
	MIBK	Xylene	
	Ethylene	Hexane	
Thermoscientific Toxic Vapor Analyzer 2020 Flame Ionization Detection (FID)	Organic Vapors	Inorganic Vapors	SCAQMD
	VOCs		

Notes: Monitoring completed June 15 through June 17, 2021.
Instrumentation calibrated at factory, pursuant to factory specifications, or daily as applicable
GX-6000 detection ranges; Methane 0-100% LEL, Hydrogen Sulfide 0-100 ppm, VOcs 0-6,000 ppb.
Thermoscientific TVA detection range; 1.0-50,000 ppm methane.
LEL= lower explosive limit, ppm = parts per million.

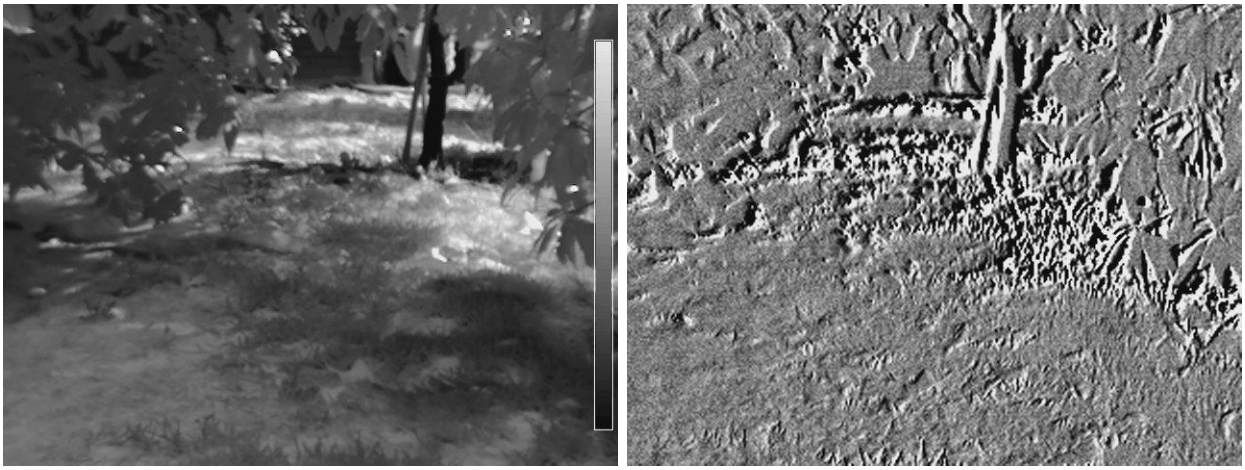
The gas/odor/vapor monitoring effort included the following procedures at each well site with the aim of detecting any emissions from potentially leaking wells, as applicable to each location:

- Using the detection instruments at the recorded location of the well;
- Using the detection instruments in a grid pattern across the area surrounding the recorded well location;
- Using the detection instruments in cracks or gaps in concrete, brick, or asphalt surfaces;
- Using the detection instruments in vents on sides of homes or buildings;
- Using the detection instruments in access spaces under mobile or raised floor homes;
- Using the detection instruments on any object that protruded from the ground (such as an old sprinkler pipe) that may serve as a conduit for gasses from potentially leaking wells; and
- Using the detection instruments in locations as requested by the public during interviews.

The gas monitoring was completed by SCAQMD, CalGEM, and MRS Environmental staff properly trained with the operation and calibration of the applicable gas monitors.

The FLIR cameras allow for identification of leaks through visual examinations using a camera. They are very effective for scanning a wide area and identifying leak locations and the FLIR cameras substantially increased the effectiveness of the inspection effort. Two cameras were utilized to help ensure effective surveys of the area. Example FLIR camera results are shown in Figure 3-18 (for survey and high-resolution modes).

Figure 3-18 Examples of FLIR Camera Monitoring



Yard in survey mode Yard in high-resolution mode

3.6.4 Well Inspection Procedure

Each inspection was unique as access at each location varied, and the number of members of the public available to interface with the inspection team ranged from several to none. The basic inspection approach is listed below:

- Initial assessment and area photographs;
- Approach residences located in the vicinity of the well location and engage the public when available and request access to backyard or other locations, if needed, depending on the well location in the CalGEM database;
- Introduce project team to the residents, if applicable;
- Explain project to the residents, if applicable, and explain abandoned and idle wells, and potential issues (infrastructure, leaks);
- Discuss with residences the three questions identified in Section 3.6.2 above;
- Allow for residences to discuss any other issues they may have questions or concerns regarding past oil and gas activities in their neighborhood;

- Perform gas monitoring as listed above and survey the area in the vicinity of the well location, as in the CalGEM database; and
- Complete the field data sheets for each well inspected (Appendices F and G).

3.6.5 Well Inspection Results

Table 3.21 below provides a summary of the overall results of the inspections including totals for the number of residences the Strike Team interfaced with during the field work. A summary describing the location description for the well locations is provided as Table 3.22.

Table 3.22 Abandoned and Idle Well Inspection Results Summary

Inspection Item	High Priority	Idle	Totals
Number of Wells Inspected	43	34	77
Above Ground Well Infrastructure Located	1	5	6
Total Number Members of the Public Interviewed	50	33	83
Wells with a Single Member of the Public Interviewed	25	16	41
Wells with Multiple Members of the Public Interviewed	10	8	18
Wells with No Members of the Public Interviewed	8	10	18
Wells with elevated Gas/Odor/Vapor Monitoring Levels Identified	0	0	0

Table 3.23 Abandoned and Idle Well Inspection Location Summary

Location Categories	High Priority	Idle	Totals
Residential Dwelling	5	2	7
Residential Front Yard	7	9	16
Residential Back Yard	10	5	15
Residential Side Yard	1	3	4
Mobile Home	4	1	5
Street	6	3	9
Parking Lot	4	2	6
Parking Structure	2	0	2
Dirt Lot	0	5	5
Paved Lot – Industrial	2	1	3
Paved Lot – Commercial	1	1	2
Current Oil Field	0	1	1
Past Oil Field	1	1	2

As shown in Table 3.21 above, most well locations allowed for the Strike Team to interface with a member of the public, either a residence with the well identified as potentially being on the property, or a neighbor of the property. The discussions with the public included the three primary questions listed above in Section 3.6.2 and other questions or concerns regarding past oil and gas development the residents noted. Interactions with the public were very positive with results of the discussions including:

- Many residents appreciated the County effort to check their backyard or other area with the gas monitors for leaks;
- No members of the public reported chronic or repeated odor or air quality issues that may have been associated with oil and gas operations;
- Most residents were not aware of previous oil and gas operations in their neighborhood;
- Many residents kept a copy of the Neighborhood Fact Sheet for future reference should they have a concern about past oil and gas operations; and
- One resident noted that he did dig up a well in his backyard as was identified by the CalGEM database (see below).

As noted in Table 3.21 above, no vapors, gases or odors were detected during the inspections at any of the well locations. One site contained a slight VOC reading as detected by the SCAQMD Toxic Vapor analyzer; however, the readings were too low to be considered significant. The location did not register a reading on either of the two other gas monitoring devices.

Table 3.22 provides location data for the well sites. Note that many locations are shown in maps to be located in residential locations in the front yard, back yard, or under the dwelling itself. One well, on the non-high priority abandoned well list, was located by a resident in his back yard at the CalGEM mapped location. Although not on the highest priority list, the Strike Team spoke with the homeowner who discovered the well head during a home improvement project. The homeowner indicated that they have worked with County Fire to have the well leak checked and the site properly backfilled pursuant to Count Fire approvals. As noted in Table 3.21 four other well locations were confirmed as mapped in the CalGEM data base with above the ground infrastructure as follows:

- Two wells at the Padelford site currently undergoing plugging and abandonment and site remediation activities;
- One well at the Inglewood Oil Field; and,
- One well with a cone vent system.

Updated well inspection field sheets are included in Appendices F and G.

Pictures of inspection activities are shown in Figure 3-19 below.

Figure 3-19 Inspection Activities

Abandoned well vent cone

Monitoring with Thermoscientific Monitor

Use of Thermoscientific and RKI Monitors

Use of FLIR Camera

3.6.6 Well Inspections Limitations

As with any inspection and investigation, there are limitations to the methodology. Although no evidence of well leakage was found during the site visits, the potential for leaks cannot be ruled out for several reasons as detailed below:

- Very few wells were visible or identifiable, due to the fact that most wells were buried. Therefore, it is not possible to confirm the validity of the database for most wells and whether crews were situated at the precise well locations when readings were obtained. Surface equipment was identified for five wells, and these were located in the exact location as the CalGEM database, thereby indicating a certain degree of confidence in the locations of the non-visible wells. In addition, by examining a large number of wells (77 wells), and areas within 100 feet of the well database location, if possible, the probability of having some of the wells in the area where readings were taken was increased.
- Without knowing the precise location of the well and using a boring-type soil vapor test for leakage at a known exact well site (a more sensitive test), lower leakage levels cannot be ruled out. The use of FLIR cameras generally only accounts for higher leakage rates. Wells that are leaking at lower levels most likely would not be detected. This limitation was partially addressed by also utilizing hand-held vapor detectors, which can detect a much lower level of leakage, and by examining confined areas, where gasses could accumulate. However, hand-held detectors cannot scan a large area and some lower level leaks would be hard to identify.
- Leakage from wells can fluctuate and might not have shown up at the exact time of the site visit. The site visits are a snap-shot and long-term occasional monitoring of higher priority wells is recommended.
- Longer-term and more sensitive methods, such as soil vapor sampling or static chamber testing, might have produced different results given a known exact location of buried wells. However, determining the exact location of buried wells is complicated and potentially very invasive. Many wells in the database are reportedly located in residential yards and under buildings, making definitive confirmation of exact location difficult. These methods were beyond the scope of the project.

The report does not provide general conclusions regarding the overall safety or integrity of the County-wide subsurface well infrastructure based on the site visits. Some wells in the study may be leaking subsurface, however, they were not identified due to not knowing the actual exact well location or the leakage rate was lower than the detection capabilities. The project also cannot make any conclusions on future risks based on the site visits.

Additionally, conversations with residents occurred on a convenience basis with residents who happened to be home at the day and time of the site visit, and no extensive, long-term attempt to survey all residents at or in the vicinity of wells was performed. Although none of the residents the Strike Team members spoke with reported odors, most were unaware of the existence of the wells and might not associate odors with oil and gas infrastructure.

The goals of the in-field study were to identify potentially high leaking wells that could produce vapor concentrations that could produce flammable or toxic health risks. By utilizing multiple detection techniques, examining numerous well's locations, confirming some of the well locations through surface equipment, the general goals of confirming the lack of immediate health risk for a snap-shot view of some the high priority wells was achieved.

3.7 Case Studies - Wells

As the Strike Team conducted the research, data collection, analysis, and other tasks to prepare the reports to conduct the Strike Team project, certain events occurred that are applicable to the subject matter and warrant review. These incidents provide recent and real-life examples of some of the challenges that arise from addressing past oil and gas activities and present the opportunity for a "lessons learned" type of review. Two recent events involving the development of properties with past oil and gas development are presented below: one related to identifying and abandoning a well and the other related to well abandonments and debris remaining from an older oil development project.

3.7.1 Marina Del Rey Well Incident

When a well reaches the end of its productive life, or if it fails to find economic quantities of oil or gas, the well operator is required by regulators to remove all equipment and plug the well to prevent leaks. Usually, cement is pumped into the well to fill at least the top and bottom portions of the well and any parts where oil, gas, or water may leak into or out of the well. This generally prevents contamination of groundwater and leaks at the surface. However, a number of wells abandoned over the last 100 plus years in the unincorporated area of the County of Los Angeles were not abandoned to today's technological standards and have subsequently been re-abandoned. In some cases, wells are found at the site of a new construction project and the developer is tasked with the proper re-abandonment of the well even if no operator of record exists for that well. Throughout the region, some wells' locations are still unknown, unaccounted for, or their records do not exist.

In the Marina del Rey case, a land developer, MDR Hotels LLC., leased property from Los Angeles County on the Marina del Rey waterfront to build a hotel. The project involves constructing a six-story Residence Inn and five-story Courtyard Marriot (288 rooms with waterfront restaurant and amenities) on the site as part of a redevelopment Project. As part of the work, MDR Hotels was required by CalGEM to re-abandon the well "DOW RGC" 10 on the property to improve the long-term safety of surface development, protect shallow fresh water, and to re-abandon the well to current standards. The 1930s era well was originally abandoned and plugged in the 1950s. CalGEM issued a permit in June 2018 to MDR Hotels to re-abandon the well.

On January 11, 2019 during plugging operations, pressure built within the well casing which caused an uncontrolled release of fluids and gas spraying into the air. The material is believed to have included natural gas (mainly methane), heavy abandonment mud, and water. To address immediate health and safety concerns, CalGEM issued an emergency order to put into place precautions to protect health, safety, and property including testing protocols and twenty-four hour

a day monitoring. The order also required that the operator prepare a report detailing what caused the blow out and emissions.

When the incident was first reported, the information provided to regulators, including DPH, was that the leak was quickly contained, and first responders reported that there was no continued release of methane. On January 18, 2019 CalGEM notified local authorities that they would be issuing an emergency order to the operator. In addition, DPH asked CalGEM to require the development of a Community Health, Safety and Notification Plan (Safety Plan) and requested that monitoring data be submitted for DPH review as it was generated. The Safety Plan was completed by the operator with the assistance of DPH, CalGEM, Los Angeles County Fire, and the Los Angeles County Department of Beaches and Harbors on February 22, 2019 (see Appendix B).

In the interim, first responders onsite reported to DPH that there were no measurable levels of natural gas in the air. Officials from CalGEM and Los Angeles County Fire Department Health Hazardous Materials Division were on site monitoring operations. Figure 3-17 shows an area map and Figure 3-18 shows the location of the well under abandonment and the adjacent proximity to residential areas.

Figure 3-20 Marina del Rey Well Area Map

Source: Incident Action Plan CA-LAC-011239 January 29, 2019.

Figure 3-21 Marina del Rey Well

Source: CalGEM January 18, 2019 Information Report.

This buried idle and improperly abandoned well is considered a typical case study of wells that can be found in the unincorporated area during construction and development activities. Note that the well, "DOW RGC" 10, was scored as a seven on the well risk prioritization scale (See Section 3.3.7). The well abandonment was completed on April 4th, 2019; however, because drill collars and a drill bit became irretrievably stuck in the wellbore when drilling a cement plug, contractors were unable to complete the cement plugs below the depth of approximately 1,500 ft., as required by the permit approved by CalGEM. The final root cause analysis for this well re-abandonment was completed on June 7th, 2019 by Exponent at the request of CalGEM; however, the document was not released to DRP until September 19th, 2019.

The findings of the root cause analysis performed were as follows:

- Insufficient integrity of the old, circa 1931, casing strings in the well allowed inflow of gas into the wellbore and beneath old cement plugs through possible corrosion holes in production casing and non-plugged manmade cuts or perforations and led to lost mud circulation problems.
- Insufficient barriers placed during previous abandonments of the well, allowed shallow gas to enter the wellbore and led to lost mud circulation problems.
- The original operators, The Ohio Oil Company and Dow Chemical Company, did not adequately characterize the shallow gas formations in the region of the well, which caused a blowout in a previous abandonment of the well in 1956.
- Lost circulation problems and lost mud while drilling through and below cement plugs at about 786-887 ft. The loss of circulation led to the decision to reduce mud weight.
- Reducing the mud weight from 9.0 pounds per gallon (ppg) to 8.4 ppg in the days before the blowout.

Other findings were as follows:

- The CWS rig supervisor, rig operator, and a rig hand who worked on the Dow RGC 10 re-abandonment operations during the period October 23, 2018 through January 13, 2019 had no evidence of, or had expired, well control course certifications. In one case the certification had expired as early as July 21, 2013.
- The Dow RGC 10 re-abandonment operations presented significant well control challenges involving shallow gas pockets and kicks, and lost circulation of drilling mud. It is most likely that gas entered and mud exited the wellbore through very old casing strings (circa 1931), which likely experienced significant corrosion and which were not well cemented.
- InterAct and CWS brought the well under control shortly after the blowout January 11th about ten minutes after the blowout began and killed the well on or about January 15, 2019. Because drill collars and a drill bit became irretrievably stuck in the wellbore when drilling a cement plug, InterAct and CWS were unable to complete the cement plugs below the depth of approximately 1,500 feet, as required by the permit approved by CalGEM. The final abandonment included more cement plugs than were required under the original permit.

The lessons learned at this well re-abandonment are applicable to a number of other wells that may need to be re-abandoned in the area in the future. The Playa del Rey oil field is located onshore of the Santa Monica Bay, primarily within and surrounding Marina del Rey. The field was discovered in 1929 and a total of 280 wells were drilled and plugged and abandoned. All these wells are in close proximity to residences and the harbor. It is not surprising that 19 of the high priority wells identified for further investigation by the Strike Team are located in the Marina del Rey area.

Some of the lessons learned and recommendations arising from Exponent's review of the plugging and abandonment effort include:

- Consideration should be given to the use of a snubbing unit or stripping operations, and a drill string internal blowout preventer (IBOP) or check valve, for future Playa del Rey re-abandonment operations. The history of surface broaches and gas kicks during the 2018-2019 well re-abandonment operations, and the historical blowouts in the Dow RGC 10 and other wells in the area suggest that the use of an IBOP or check valve could have been beneficial. In particular, these considerations may be appropriate for drilling through old cement plugs, beneath which gas may accumulate through old corroded casing. The use of an IBOP or check valve as a contingency component of the BOPE system could have reduced the risk of gas flow up the drill pipe and likely could have prevented the blowout on January 11, 2019.
- Re-abandonment of old wells may seem rather straightforward, but as has been demonstrated in the Playa del Rey oilfield both historically and in contemporary time, well control due to the presence of shallow gas formation is challenging. The Operator should plan well control contingencies for shallow gas in this region, since there is a history of blowouts involving shallow wells. Old wells, such as the Dow RGC 10 spudded in 1931, in which casing and cement integrity is suspect, should be carefully examined for risk versus reward for determining if re-entry is truly warranted.
- The use of lost circulation materials as a means of plugging casing holes or leaks should be carefully considered. In most situations, it may be more efficacious and prudent to take the time to perform squeeze cementing operations. Squeeze cementing operations are not

without risks. If a squeeze cementing protocol was established to "seal" annular flow paths, then drilling up the cement could lead to sidetracking operations. Drilling hard cement with weight on bit could cause the bit to mill corroded casing and formation easier than hard cement.

- During operations in which lost returns and gas kicks are occurring, weighting up the drilling mud should be the first priority to prevent gas influxes.
- Characterize shallow gas sands in the Playa del Rey Field, which have caused well control issues and blowouts in the past and again recently. It is recommended that a new well be drilled at a suitable location and depth in the Playa del Rey field area, in which a complete logging program should be performed, focusing on geological characterization. Also, production testing should be performed to investigate the extent and pressure of shallow natural gas formations.
- It is recommended that a study be performed to gather information on geological logging and wellbore abandonment configurations of all 279 Playa del Rey oil wells, at least for those wells for which such information exists. CalGEM data shows that all 279 wells are currently plugged and abandoned, as indicated by a "P" status in CalGEM online records.

The County notes here that downhole operations are under the jurisdiction of CalGEM and that CalGEM staff have reviewed the Exponent Report.

3.7.2 Bridge Point Gardena Project Mercaptan Release

On Thursday, September 10, 2020, at 11:20 a.m., during clean up and remediation activities at a development site, a two-gallon container of mercaptan (a chemical used to odorize natural gas) was spilled. The spill resulted in a natural gas odor permeating the immediate area and areas downwind to the East of the project site. County firefighters responded and as a precautionary measure nearby residents were asked to remain indoors until the odor dissipated. Mercaptan is not a fire hazard but does cause significant odor issues when released to the environment. The container of mercaptan was a remnant of the past oil and gas development on the property and was subsequently cleaned up and removed for offsite disposal.

The project site, in the unincorporated area of Compton (APN 6131018031 and 6131018032, involves the construction of two buildings to be used as warehouses. The project site includes the eight oil wells as listed in Table 3.20 below.

Table 3.24 Bridge Point Gardena Project Site Wells

Well API	Well Name	Pre-Project CalGEM Well Status	Post-Project Well Status (as of 9/2021)
0403714986	PadelFord 1	Plugged	Permit issued but work has not started
0403714987	PadelFord 2	Idle	Plugged and abandoned
0403714988	PadelFord 3	Idle	Plugged and abandoned
0403714989	PadelFord 4	Idle	Abandonment in progress
0403714990	PadelFord 5	Idle	Permit issued but work has not started
0403714501	Chandler 1	Active	Plugged and abandoned
0403714494	Chandler 3	Idle	Plugged and abandoned

Well API	Well Name	Pre-Project CalGEM Well Status	Post-Project Well Status (as of 9/2021)
0403714495	Chandler 4	Active	Plugged and abandoned

Source: CalGEM Well Finder January 2021, Bridge Point Gardena.

All the wells are slated to be plugged and abandoned, or re-plugged and abandoned, during the cleanup and remediation of the oil and gas infrastructure at the project site. Figure 3-19 provides a Google Earth map of the project site along with the locations of the wells.

Figure 3-22 Bridge Point Gardena Project Aerial Map

Source: Google Earth January 2021, CalGEM Well Finder January 2021

Multiple regulatory agencies including LA County Department of Public Health, Department of Regional Planning, LA County Supervisors Office, LA County Fire, LA County Fire Health Hazardous Materials Division and the South Coast Air Quality Management District responded to the mercaptan spill. The Department of Public Health further recommended that the developer prepare and submit a Community Health, Safety, and Notification Plan. The purpose of the plan is to inform the public of the following:

- Days, work times, and duration of the project;
- Emergency contact information;
- Strategies for protecting the community of possible hazards; and,
- Contact information for the public agencies overseeing the work.

The developer, Bridge Point Gardena, submitted the plan in October 2020 which included the following to minimize environmental impact and disruption to the surrounding residential neighborhood:

- Work schedule in days, time of day and expected duration;
- Emergency contact numbers;
- Worksite hazards and monitoring protocol;
- Dust control and monitoring;
- Noise control and monitoring;
- Odor control and air emissions monitoring;
- Light control and monitoring; and,
- Community notifications.

Members of the Strike Team reviewed the project site, details of the mercaptan spill, and reviewed and provided comments on the Community Health, Safety, and Notification Plan. During this process, several comments and recommendations were developed about the development of sites that contain past oil wells and or associated oil well infrastructure. Specific recommendations with respect to County permitting and project review for project sites with past oil and gas infrastructure (O&G Site Projects) include:

- Review, analyze, and strengthen County Department (Public Health, Public Works, Regional Planning) current oversight and monitoring for O&G Site Projects in coordination with CalGEM regulations;
- Require Community Health, Safety, and Notification Plans for O&G Site Projects;
- Review which County Department (Public Health, Public Works, Regional Planning) is best suited to review, approve, and provide monitoring of Community Health, Safety, and Notification Plan requirements;
- Implement a process whereby "by right" projects are checked for oil wells to ensure applicable projects are subject to a Community Health, Safety, and Notification Plan and monitoring;
- Require public noticing for "by right" O&G Site Projects to ensure the surrounding neighborhoods of these projects has access to project information and the Community Health, Safety, and Notification Plan;
- Develop a GIS layer for Regional Planning to include all existing oil wells independent of their current CalGEM status;
- Develop a comprehensive list of regulatory agency requirements for the plugging and abandonment of oil wells and disposition of associated hazardous wastes and protection of health and safety for nearby communities during well-plugging activities;
- Generate a chronological list/flow chart of the requirements noted above to ensure all applicable agencies are notified when an oil well is found;

- Revise the ministerial permitting process, including modification to the permit application and GIS review, to include review for existing oil wells on project sites; and,
- Revise the discretionary permitting process, including modification to the permit application and GIS review, to include review for existing oil wells on project sites.

3.7.3 West Hills Site – Canoga Park

Although not visited by the Strike Team, the Board requested that we include this case study in the report. Canoga Park Oil Field in the County of Los Angeles is located approximately ½ mile west of the entrance of El Escorpión Park at 24415-24425 Vanowen St, West Hills, CA 91307. Canoga Park Oil Field contains a total of 11 wells, but only six wells are physically visible at the surface: Knapp 3 (Frank Knapp), Knapp 1, Knapp 1-A, Knapp 4-1, Knapp 6, and Lucky Star 1. The remaining wells are believed to be buried.

On February 25, 2021, CalGEM issued a Notice of Noncompliance to Shinnecock Enterprises, Inc., the current owner of the parcels located at APNs 2031-015-002, 2031-015-003, and 2031-015-011 at the Canoga Park Oil Field. CalGEM observed that at least two of the idle or abandoned wells at the Canoga Park Oil Field are leaking hydrocarbons to the surface which poses a potential threat to groundwater and hazard to public health, safety, and the environment. CalGEM requested that the following remedial actions be taken as soon as possible:

- Install fencing around each wellhead or group of visible wells to prevent public access, in accordance with California Code of Regulations, title 14, section 1778.; and
- Clear vegetation around each wellhead or group of wellheads to reduce fire risk.

On June 3, 2021, a CalGEM Engineering Geologist conducted a field site visit to the Canoga Park Oil Field.

Dense vegetation up to six feet tall covers the well site and remains unchanged since a CalGEM visit in December 2019. The access road to the wells is poorly maintained and narrows to as little as two feet due to a partial washout prior to 2002, making vehicle passage impossible. Photos were taken of each well head and the same area was scanned with a Forward Looking Infrared (FLIR) camera. The FLIR camera detected no gas from any wellhead at the site, and each wellhead is completely accessible without any fencing or enclosure of any kind.

- Knapp 3 (Frank Knapp) (API # 037-00494) is filled with visible hydrocarbons to the surface, and some bubbles can be seen on that same hydrocarbon surface. Despite the presence of bubbles in this well, the FLIR camera showed no gas. A large stain around the wellhead is visible and appears larger than during the CalGEM visit in 2019.
- Knapp 1-A (API # 037-01162) appears unchanged from the CalGEM visit in 2019.
- Knapp 1 (API # 037-01161), located further afield, appears similar to the CalGEM visit in 2019. Much of the vegetation right at the wellhead has been removed revealing some visible staining at the base of the riser.
- Much further afield is Knapp 6 (API # 037-01166), which has a much larger and visible casing at the surface. A stranded rabbit was found inside the well approximately five feet down. A technician was dispatched to the Oil Field following a call to Los Angeles Animal

Control. The technician was guided to the well and was able to free the rabbit, releasing the animal nearby.

- Knapp 4-1 (API # 037-01160) had a pup-joint riser during the CalGEM visit in 2019, but that riser is now detached and laying on the nearby hillside. Knapp 4-1 appeared to have some fluid visible within the casing. The casing sits at the bottom of a small excavation which has now partially filled in.
- Lucky Star 1 (API # 037-01167) remains largely unchanged from 2019. The casing is buried under cement and other debris on the site, but the cellar and cement pad remain.

The wells do not appear to have an active operator. CalGEM is investigating the ownership of the mineral rights and to ascertain a responsible party. Once this is done, CalGEM will issue an order to plug and abandon the wells.

Table 3.25 Idle or Abandoned Canoga Park Oil Field Wells Located on the Properties

Well API	Well Name	Well Status
037-00494	Knapp 3 (Frank Knapp)	Visible (leaking)
037-01161	Knapp 1	Visible (leaking)
037-01162	Knapp 1-A	Visible
037-01168	Knapp 2 (McCarthy)	Not visible
037-01163	Knapp 3	Not visible
037-01164	Knapp 4	Not visible
037-01160	Knapp 4-1	Visible
037-01165	Knapp 5	Not visible
037-01166	Knapp 6	Visible
037-01167	Lucky Star 1	Visible
037-01169	Lunnon 1	Not visible

3.8 Existing Discretionary Permits

The Department of Regional Planning is currently reviewing existing oil well discretionary entitlements issued between the 1940s and 1970s. Discretionary permits issued during this period had no expiration dates and offered limited opportunities for oversight. There are seven existing Regional Planning discretionary entitlements that cover approximately 300 oil wells in the unincorporated LA County area. The primary goal of this effort is verification of operator compliance with permit conditions via in-depth research and site visits, along with appropriate enforcement actions.

3.9 Recommendations

3.9.1 Procedures for Development Review in Areas where Oil and Gas Activities Have Previously Occurred

Based on the findings of the Strike Team in looking at the number of abandoned and idle wells in the unincorporated areas, it is necessary to adopt a set of procedures to be used by planning staff when encountering development applications in areas where previous oil and gas development activities have occurred. The Procedures below are recommended for review by the DRP and adopted internally as part of the application review efforts. In addition, the procedures provide guidance to future developers on what needs to be done when encountering oil and gas wells in property slated for development.

3.9.1.1 General Procedures for Staff

These procedures are provided as recommendations for staff to consider when reviewing development project where oil and gas development may have occurred.

1. Develop a GIS layer to include all existing oil wells and gas (regardless of their status) for GIS Net. Flag identified priority wells in DRP systems for case intake purposes. For new development on properties where a priority well exists, ensure coordination with CalGEM and other applicable agencies for builder/property owner to address any well issues.
2. Collect all requirements from all agencies involved in projects that have jurisdiction on oil and gas activities.
3. Use the comprehensive list to incorporate in existing permitting workflows to ensure all agencies are notified when an oil and gas well is found, or where wells are likely to be present at the site of a development project.
4. Ensure that the discretionary permit circulation process with other agencies include the agencies involved that regulate oil and gas wells/chemical storage and develop a protocol to halt the permitting process if a requirement is missing.
5. Revise the ministerial process to include verification of existing oil and gas wells on project sites (modifying application and verifying GIS layer) and develop a vetting process that includes verifying if an oil and gas well exists and compliance confirmation from all respective agencies that all oil well requirements are met.
6. These procedures and this guidance are not intended to take the place of any CalGEM required procedures.
7. Provide information on existing and proposed easements that may interfere with future well abandonment.

3.9.1.2 General Procedure for Developers

This would be applicable to developers who have identified wells in their property where future development would occur. These efforts would have to be undertaken as part of the application process and the project due diligence.

1. All previously abandoned wells in the property shall be tested for gas leakage and visually inspected for oil leakage in accordance to CalGEM requirements. Wells would have to be tested prior to any approval for development to determine if the well is leaking and to determine if the well needs to be reabandoned prior to the new development occurring.
2. Leaking Well. A well shall be considered leaking if the meter reading is greater than 50 parts per million (ppm) as observed by CalGEM or other specifications as delineated by CalGEM. If wells are found to be leaking, to the well shall be abandoned to current CalGEM well abandonment standards.

The following recommendations are applicable when wells are known to exist or are suspected to exist on a property that is slated for development. These requirements are recommended to be submitted by developers when they are applying for their permits to DRP. The requirements below are to be part of the application process and required prior to issuing permits.

PROVIDE A SITE PLAN

1. Well location / Identification
2. Property boundaries
3. Proposed and Existing Structures
4. Proposed roads and streets
5. Plot all existing and proposed oil field facilities that will operate after completion of development, if applicable
6. Provide Close Proximity Specifications Drawing– Indicating the ability to have vehicle and/or rig access to the well (provide actual dimensions).

PROVIDE A WELL SURVEY

1. Licensed Surveyor – stamped and signed
2. All active, idle and abandoned wells shown
3. Provide Close Proximity Specifications Drawing– - Vehicle and / or rig access to the well, provide actual dimensions
4. NAD 83 well location or equivalent

CONDUCT A LEAK TEST

1. CalGEM complete oil well files for each oil well to be leak tested should be provided to the leak test contractor responsible for testing the oil wells. Leak tests typically need to be observed and approved by CalGEM.

2. Leak tests should be observed by the County or CalGEM personnel
3. The leak test should include sampling with a portable gas detector testing and a soap bubble test.
4. The leak test shall be completed utilizing a portable gas detector approved in advance by CalGEM.
5. Following a successful leak test, a metal top plate should be welded by a licensed welder in the presence of CALGEM (per CALGEM requirements).
6. Site Restoration. Following all testing and inspection, the test area should be returned to its previous state and fencing may be required around the area or the entire site.
7. A Leak Test Report should be submitted to the County including the following:
    a. Test and visual documentation with photos, including name and contact information of CalGEM or County personnel observing.
    b. Photos of the well head should include all visible casing and the plate to be tack-welded onto the casing.
    c. Photos and/or videos showing the monitor and the soap bubble test.
    d. The plate or cap to be tack welded onto the casing should identify the API number of the well, the name of the well and the date the well was last entered.
    e. Indicate the equipment used in leak testing, such as a GT-43 gas detection meter or equivalent along with calibration data.
    f. The testing firm name, qualifications, certification and/or license information.
    g. Any CalGEM correspondence and documentation, including a Construction Site Well Inspection report or other letters.

INSTALL VENT RISERS AND CONES

Vent risers and vent cones shall be installed prior to completing site grading activities. Vent cones shall have a minimum 4 ft diameter cone extending 2 ft minimum above the abandoned well cap and backfilled with 3/4 in. gravel and shall allow for leak testing the well at the surface. Vents shall include a rain guard to prevent water intrusion. Provide drawings showing the vent cone design to the County as part of plan submission.

3.9.2 Recommended Development Standards

In addition to the above, it is recommended that the County adopt a series of development standards specifically designed to address development in areas where oil and gas activities have previously occurred. These development standards can be included in the oil and gas ordinance currently under preparation by the County.

The following development standards shall be applied to all redevelopment projects within the footprint of where previous oil or gas development has occurred, including any building permit involving a current or former oil or gas site:

1. Any demolition, abandonment, re-abandonment, or restoration shall be adequately monitored by the appropriate County agency, funded by the permittee or operator, to ensure compliance with those conditions designed to mitigate anticipated significant adverse effects on the environment and to provide recommendations in instances where effects were not anticipated or mitigated by the conditions imposed on the permit or entitlement. Pre-restoration and post-restoration surveys of sensitive biological resources shall be employed as appropriate to measure compliance.
2. The site shall be assessed for all previously unidentified contamination. The permittee shall ensure that any discovery of contamination shall be reported to the appropriate County agency and the Los Angeles County Fire Department.
3. The permittee shall obtain all necessary permit approvals, including revisions to an entitlement or the demolition, abandonment, re-abandonment and restoration permit, if any are required, in order to remediate the contamination.
4. The permittee shall be responsible for any cost to remediate the contamination on the site. This section is not intended to limit the permittee or operator's rights under the law to seek compensation from parties who have contributed to contamination of the site.
5. The permittee shall ensure that appropriate notification has been recorded with the County Recorder to describe the presence and location of any contamination left in place under the authority of the Los Angeles County Fire Department.
6. All abandoned or re-abandoned wells shall be leak tested subject to the following requirements:
    a. All abandoned wells located within an oil and gas site must be tested for gas leakage and visually inspected for oil leakage. The operator shall apply for a CalGEM inspection permit to witness the well testing. The leak test shall be completed utilizing a gas detection meter approved in advance by the County and shall be conducted by a State licensed geotechnical or civil engineer or a State registered environmental assessor, class II, or a designee of the County.
    b. The permittee shall prepare and submit a methane assessment report for each tested well prepared per the City of Los Angeles Department of Building and Safety "Site Testing Standards for Methane" (P/BC 2014-101), as may be amended. Following satisfactory test results as per the City of Los Angeles Department of Building and Safety standards (City of Los Angeles standards for methane are used because they are more comprehensive than current methane standards by the County), a well vent and vent cone shall be installed to the satisfaction of the appropriate County agency and in compliance with the recommendations contained in the methane assessment report.
    c. The submitted methane assessment report shall be prepared by a State licensed geotechnical or civil engineer. A well shall be considered leaking if the leak test report indicates the meter read is greater than level II as defined by the City of Los Angeles Department of Building and Safety "Site Testing Standards for Methane," which is set at one thousand (1,000) parts per million. (City of Los Angeles standards for methane are used because they are more comprehensive than current methane standards by the County).

d. An approved methane assessment report is valid for twenty-four (24) months from approval by the appropriate County agency. If an abandonment permit has not been issued by this time, retesting shall be required. Following all testing and inspection, the test area shall be returned to its previous state to the satisfaction of the appropriate County agency.
e. If there has not been any change to the well (no additional drilling or plugging efforts have occurred), no leak test is required if a valid methane assessment report, accepted by the appropriate County agency and showing no leaks in excess of the leak limit, has been completed for an abandoned or re-abandoned well within the prior twenty-four (24) months.

7. Prior to any development or redevelopment of a current or former oil or gas site, or prior to abandoning or re-abandoning any well, the operator shall:
    a. Obtain permit(s) and abandon all idled wells and provide a certificate of compliance to show that the wells and/or sites are abandoned consistent with standards recommended or required by CalGEM to the satisfaction of the County. Permits shall not be required if the idled well is scheduled to produce oil or natural gas, or to be used for injection, as part of the development or redevelopment of a former oil or gas site and if said production or injection occurs within five (5) years of issuance of a permit.
    b. Obtain permit(s) to re-abandon all previously abandoned wells that do not meet standards recommended or required by CalGEM for abandonment in effect at the time of re-abandonment and provide a certificate of compliance that the wells and/or sites are re-abandoned consistent with current conditions and standards recommended or required by CalGEM to the satisfaction of the appropriate County agency.
    c. In lieu of subsections (7a) and (7b) of this Section, obtain a deferral covenant from the appropriate County agency requiring abandonment or re-abandonment to standards recommended or required by CalGEM, or equivalent standards as determined by the County, at a specific time or upon the occurrence of a future event. The deferral covenant shall be approved as to form by County Counsel, contain a provision to indemnify and hold harmless the County for damages related to wells not abandoned or re-abandoned consistent with standards recommended or required by CalGEM, and shall be recorded by the operator with the County Clerk prior to approval.

3.9.3 High Priority Wells Monitoring

As detailed in the Report, 128 wells were identified as high priority wells, and 43 of those wells were visited by the Strike Team to ascertain whether those highest priority wells presented any ongoing danger to the health and safety of the community or to the environment. In addition, 35 idle wells were also inspected as part of the Strike Team efforts. Although the Strike Team was unable to find any evidence of leaking wells during the inspections, this does not necessarily mean that those wells are not leaking, nor that they will not leak in the future. The prioritization scheme developed by the Strike Team and ratified by CalGEM proved to be a useful tool in prioritizing wells that could potentially leak. In addition, it is recommended that high priority wells (both plugged and abandoned; and idle wells) continue to be monitored by CalGEM or the County to

ensure that, if leaks are detected, those wells can be prioritized for plugging and abandonment to today's standards. It is recommended that all high priority wells are revisited every 3 to 5 years. In addition, it is recommended that those wells that were not inspected as part of this effort be inspected in the future to ascertain their status. It is also recommended that the County work with an expert consultant to continue monitoring wells within the timelines established above.

3.9.4 Idle Wells

As noted above, idle wells present a unique challenge because there are idle wells that are not part of an Idle Well Management Program and are labeled as idle by CalGEM as a default when no additional information is known about the status of the well. Idle wells are those wells that have historically not been recorded as having been plugged and abandoned and are not currently operating and producing oil/gas. Some idle wells may have just been left and potentially buried by a previous operator, and not properly abandoned. Wells that have not been properly plugged and abandoned, and are not being actively managed, can present a potential risk to the public or environment if they are associated with reservoirs that have some potential for gas production. As a result, the Strike Team is recommending that the Board requests that CalGEM conduct an audit of wells that are labeled idle in their database and determine a path forward for ensuring that those wells do not constitute a potential source of emissions and public health or environmental impacts. Long term idle wells should be prioritized for evaluation and proper plugging and abandonment as appropriate.

4.0 Oil and Gas Pipelines

Initial Project Staff work on oil and gas pipelines consisted of a meeting with a member of the Advisory Panel (Matt Rezvani), review of pipeline inspection regulations, interactions with the Office of the State Fire Marshall to obtain detailed pipeline data, and review of the National Pipeline Mapping System (NPMS) data.

4.1 Advisory Panel Member Matt Rezvani Meeting

Project Staff met with Mr. Rezvani on October 25, 2018 at the County DRP offices. Mr. Rezvani was involved with drafting of the California Pipeline Safety Act as well as some California oil spill legislation and is an asset and resource to the Strike Team. The discussion included an overview of the Elder California Pipeline Safety Act of 1981 which authorized the State Fire Marshal to exercise exclusive safety, regulatory, and enforcement authority over intrastate hazardous liquid pipelines and implement the Federal Hazardous Liquid Pipeline Safety Act. Components of the legislation provide for annual inspections and testing of hazardous liquid pipelines as discussed in detail in Section 4.2 below. Mr. Rezvani also provided input and direction to Project Staff on obtaining pipeline data, the fact that regulatory agencies have staffing challenges with regards to pipeline oversight, that the State has a significant number of abandoned pipelines, and the fact that many utility transmission pipelines in the State were built long ago and are now in or adjacent to new residential development.

4.2 Pipeline Inspection Regulations

Pipeline regulations that dictate maintenance and testing requirements are based on State and Federal regulations for pipeline safety. The discussion below provides the basis for the State's regulations and the Federal guidance that is promulgated within those regulations.

4.2.1 State Regulations - California Pipeline Safety Act of 1981

This Act grants regulatory jurisdiction to the State Fire Marshal for the safety of all intrastate (i.e., within state) hazardous liquid pipelines and all interstate (i.e., between states) pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations. Recent amendments require pipelines to include leak prevention and cathodic protection (i.e., the application of an electrical charge to a pipeline to prevent corrosion) systems as reviewed and approved by the State Fire Marshal. All new pipelines must also be designed to accommodate passage of instrumented inspection devices (smart pigs) through the pipeline.

State of California Government Code Parts 51010 through 51018 provide specific safety requirements including periodic hydrostatic testing of pipelines, specific accuracy requirements on leak rate determination, hydrostatic testing by state-certified independent pipeline testing firms, pipeline leak detection, and reporting of all leaks. Specific testing requirements of various intrastate pipelines are as follows:

Under Section 51012.3(a)(3), pipelines must meet cathodic protection requirements in accordance with Section 195.414 of Title 49 of the Code of Federal Regulations. Section 195.416 requires also that each operator shall, at intervals not exceeding 15 months, but at least once each calendar year,

conduct tests on each buried, in contact with the ground, or submerged pipeline facility in its pipeline system that is under cathodic protection to determine whether the protection is adequate. Each operator shall, at intervals not exceeding 2 ½ months, but at least six times each calendar year, inspect each of its cathodic protection rectifiers. Each operator shall, at intervals not exceeding 5 years, electrically inspect the bare pipe in its pipeline system that is not cathodically protected and must study leak records for that pipe to determine if additional protection is needed.

Pipelines built after 1990 are required to be piggable (accommodate the passage of instrumented internal inspection devices) (Section 51013).

Section 51013.5 of the Public Safety Code requires pipeline testing as follows:

- Pipelines without automatic pressure relief devices shall be hydrostatically tested annually;
- Pipelines over 10 years of age and not provided with effective cathodic protection shall be hydrostatically tested every three years, except for those on the State Fire Marshal's list of higher risk pipelines, which shall be hydrostatically tested annually;
- Pipeline over 10 years of age and provided with effective cathodic protection shall be hydrostatically tested every five years, except for those on the State Fire Marshal's list of higher risk pipelines which shall be hydrostatically tested every two years;
- Piping within a refined products bulk loading facility served by a pipeline shall be tested hydrostatically at 125 percent of maximum allowable operating pressure utilizing the product ordinarily transported in that piping if that piping is operated at a stress level of 20 percent or less of the specified minimum yield strength of the pipe. The frequency for pressure testing these pipelines shall be every five years for those pipelines with effective cathodic protection and every three years for those pipelines without effective cathodic protection. If that piping is observable, visual inspection may be the method of testing;
- Test methods other than the hydrostatic tests required above, including inspection by instrumented internal inspection devices, may be approved by the State Fire Marshal on an individual basis. If the State Fire Marshal approves an alternative to a pressure test in an individual case, the State Fire Marshal may require that the alternative test be given more frequently than the testing frequencies specified above;
- The test pressure for each pressure test conducted must be maintained throughout the part of the system being tested for at least 4 continuous hours at a pressure equal to 125 percent, or more, of the maximum operating pressure and, in the case of a pipeline that is not visually inspected for leakage during test, for at least an additional 4 continuous hours at a pressure equal to 110 percent, or more, of the maximum operating pressure; and,
- When hydrostatic testing is required by Section 51013.5, the test results shall be certified by an independent testing firm or person who is selected from a list, provided by the State Fire Marshal, of independent testing firms or persons approved annually by the State Fire Marshal.

Section 51055.1 provides that commencing January 1, 2017, the State Fire Marshal, or an officer or employee authorized by the State Fire Marshal, shall annually inspect all intrastate pipelines and operators of intrastate pipelines under the jurisdiction of the State Fire Marshal to ensure

compliance with applicable laws and regulations. Per the State Fire Marshal Guidelines each inspection shall contain the following:

- Evaluation of the risks to each intrastate hazardous liquid pipeline based upon the operator history, integrity testing results, preventative and mitigative measures, construction activities, leak history, and compliance history;
- An annual inspection of each operator of an intrastate hazardous liquid pipeline in accordance with California State Fire Marshal Annual Inspection Procedures dated July 1, 2016; and,
- An annual inspection of each intrastate hazardous liquid pipeline in accordance with California State Fire Marshal Annual Inspection Procedures dated July 1, 2016.

Each operator of an intrastate hazardous liquid pipeline shall complete and submit to the Office of the State Fire Marshal Form PSD-101 for each intrastate hazardous liquid pipeline no later than July 1st annually.

4.2.2 CalGEM Regulations

CalGEM has regulations that typically apply to smaller flowlines, pipelines within oil fields, gathering lines, production lines or injection lines typically within the administrative boundaries of an oil and gas field. New regulations for certain pipelines associated with California oil and gas production (Assembly Bill 1420) became effective on October 1, 2018. The regulations now require as follows:

- Operators shall visually inspect all aboveground pipelines for leaks and corrosion at least once a year;
- Operators shall inspect all active gas pipelines in sensitive areas (buildings within 300 feet of an active pipeline, areas determined to be a significant threat from a leak, or a pipeline with a chronic leak history) that are 10 or more years old for leaks or other defects at least once a year, or at a frequency approved by CalGEM's State Oil and Gas Supervisor and listed in the operator's Pipeline Management Plan. The operator shall conduct the inspection in accordance with applicable regulatory standards or, in the absence thereof, an accepted industry standard that is specified by the operator and listed in the Pipeline Management Plan;
- CalGEM may order such tests or inspections deemed necessary to establish the reliability of any pipeline system. Repair, replacement, or cathodic protection may be required;
- Operators shall conduct pressure testing using: (A) The guidelines recommended by industry standards, such as the American Petroleum Institute, American Society of Mechanical Engineers for oil or gas pipelines; or (B) The method approved by the State Fire Marshal, Pipeline Safety Division for liquid pipelines or U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration for gas pipelines; on any pipeline that has had a leak resulting in the release of a fluid in a quantity that triggers reporting of the release under any regulatory, statutory, or other legal requirement. The pipeline shall not be returned to service unless the pressure testing has been

successfully completed. Test results shall be provided to the CalGEM for review within seven days following the test;

- The operator shall perform periodic mechanical integrity testing on all active environmentally sensitive pipelines that are gathering lines, all urban pipelines over 4" in diameter, and all active gas pipelines in sensitive areas. The mechanical integrity testing shall be conducted every two years, or at an alternative frequency approved by CalGEM based on demonstrated wall thickness and remaining service life over a period of at least two years. The testing frequencies shall be specified in the operator's Pipeline Management Plan. Pipelines less than 10 years old are exempt from the two-year testing requirements of this subdivision. These tests shall be performed to ensure the pipeline integrity by using at least one of the following methods: Subject to review and approval by CalGEM, the operator shall identify effective mechanical integrity testing methods based on pipeline type and use. The mechanical integrity testing methodology for compliance with this subdivision shall be specified in the operator's Pipeline Management Plan and shall include at least one of the following: (1) Nondestructive testing using ultrasonic or other techniques approved by CalGEM, to determine wall thickness; (2) Pressure testing consistent with CSFM regulations; (3) Internal inspection devices such as a smart pig, as approved by CalGEM; Any other method of ensuring the integrity of a pipeline that is approved by the State Oil and Gas Supervisor that ensures mechanical integrity so as to protect life, health, property and natural resources; and,
- Copies of mechanical integrity test results shall be maintained in a local office of the operator for ten years and made available to the CalGEM, upon request. The operator shall assess all test results to determine continued safe operations and that risks identified in the Pipeline Management Plan are adequately addressed. The operator shall repair and retest or remove from service any pipeline that fails the mechanical integrity test. CalGEM shall be promptly notified in writing by the operator of any pipeline taken out of service due to a test failure.

4.2.3 California Public Utility Commission Regulations

The California Public Utilities Commission (CPUC) regulations on pipelines are considered to not supersede the Federal Pipeline Safety Regulations but are supplements to the Federal Regulations. The Regulations provide minimum requirements for the design, construction, quality of materials, locations, testing, operations and maintenance of facilities used in the gathering, transmission and distribution of gas and in liquefied natural gas facilities to safeguard life or limb, health, property and public welfare and to provide that adequate service will be maintained by gas operators under the jurisdiction of the CPUC.

For CPUC lines the following requirements apply: At least 60 days prior to the construction of a new pipeline, reconstruction, or reconditioning of an existing pipeline, a report shall be filed with the CPUC setting forth the proposed route and general specifications for such pipeline. The specifications shall include but not be limited to the following items:

- Description and purpose of the proposed pipeline;

- Specifications covering the pipe selected for installation, route map segregating incorporated areas, class locations and design factors, and terrain profile sketches indicating maximum and minimum elevations for each test section of pipeline;
- Maximum allowable operating pressure for which the line is being constructed;
- Test medium and pressure to be used during strength testing; and,
- Protection of pipeline from hazards and external corrosion.

For distribution and transmission systems the following regulations apply for leakage surveys and procedures:

- A gas leak survey, using leak detecting equipment, must be conducted in business districts and in the vicinity of schools, hospitals, and churches, including tests of the atmosphere in gas, electric, telephone, sewer, and water system manholes, at cracks in pavement, and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 15 months, but at least once each calendar year; and,
- A gas leakage survey of transmission pipelines, using leak detecting equipment must be conducted at least twice each year and at intervals not exceeding 7 ½ months.

4.2.4 Federal Regulations

Some hazardous liquid pipelines are under the jurisdiction of the Department of Transportation (DOT) and must follow the regulations in 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline, as authorized by the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. 2004). Other applicable Federal requirements are contained in 40 CFR Parts 109, 110, 112, 113, and 114, pertaining to the need for Oil Spill Prevention Control & Countermeasures (SPCC) Plans; 40 CFR Parts 109– 114 promulgated in response to the Oil Pollution Act of 1990.

Part 195.30 incorporates many of the applicable national safety standards of the:

- American Petroleum Institute (API);
- American Society of Mechanical Engineers (ASME);
- American National Standards Institute (ANSI); and,
- American Society for Testing and Materials (ASTM).

Part 195.50 requires reporting of accidents by telephone and in writing for:

- Explosion or fire not intentionally set by the operator;
- Spills of five gallons or more or five barrels if confined to company property and cleaned up promptly;
- Daily loss of five barrels a day to the atmosphere;

- Death or injury necessitating hospitalization; or
- Estimated property damage, including cleanup costs, greater than $50,000.

Reporting is to the National Response Center (NRC) at 800-424-8802. The NRC is a part of the federally established National Response System and staffed 24 hours a day by the U.S. Coast Guard. It is the designated federal point of contact for reporting all oil, chemical, radiological, biological and etiological discharges into the environment, anywhere in the United States and its territories. The NRC also takes maritime reports of suspicious activity and security breaches within the waters of the United States and its territories.

The Part 195.100 series includes design requirements for the temperature environment, variations in pressure, internal design pressure for pipe specifications, external pressure and external loads, new and used pipe, valves, fittings, and flanges.

The Part 195.200 series provides construction requirements for standards such as compliance, inspections, welding, siting and routing, bending, welding and welders, inspection and nondestructive testing of welds, external corrosion and cathodic protection, installing in-ditch and covering, clearances and crossings, valves, pumping, breakout tanks, and construction records.

The Part 195.300 series prescribes minimum requirements for hydrostatic testing, compliance dates, test pressures and duration, test medium, and records.

The Part 195.400 series specifies minimum requirements for operating and maintaining steel pipeline systems, including:

- Correction of unsafe conditions within a reasonable time;
- Procedural manual for operations, maintenance, and emergencies;
- Training;
- Maps;
- Maximum operating pressure;
- Communication system;
- Cathodic protection system;
- External and internal corrosion control;
- Valve maintenance;
- Pipeline repairs;
- Overpressure safety devices;
- Firefighting equipment; and,
- Public education program for hazardous liquid pipeline emergencies and reporting.

Part 195.452 addresses Pipeline Integrity Management Plans (IMP) in High Consequence Areas for Hazardous Liquid Operators which were existing on or after May 29, 2001. IMPs specify regulations to assess, evaluate, repair and validate, through comprehensive analysis, the integrity of hazardous liquid pipeline segments that, in the event of a leak or failure, could affect populated areas, areas unusually sensitive to environmental damage, and commercially navigable waterways. Section h.4 of 49 CFR 195.452 specifies repair criteria for pipelines based on smart pig results. These require that immediate repairs shall be conducted for the following conditions:

- Metal loss greater than 80% of nominal wall regardless of dimensions;
- Predicted burst pressure less than the established maximum operating pressure;
- A dent located on the top of the pipeline that has any indication of metal loss, cracking or a stress riser; and,
- A dent located on the top of the pipeline with a depth greater than 6% of the nominal pipe diameter.

An operator must schedule evaluation and remediation of the following conditions within 60 days for the following conditions:

- All the items listed above for the immediate repair period;
- A dent located on the top of the pipeline with a depth greater than 3% of the pipeline diameter (or 0.250 inches in depth for a pipeline diameter less than 12”); and,
- A dent located on the bottom of the pipeline that has any indication of metal loss, cracking or a stress riser.

An operator must schedule evaluation and remediation of the following conditions within 180 days for the following conditions:

- All the items listed above for the 60 day and immediate repair periods;
- A dent with a depth greater than 2% of the pipeline's diameter that affects pipe curvature at a girth weld or a longitudinal seam weld (or 0.250 inches in depth for a pipeline diameter less than 12”);
- A dent located on the top of the pipeline with a depth greater than 2% of the pipeline's diameter (or 0.250 inches in depth for a pipeline diameter less than 12” (NPS 12));
- A dent located on the bottom of the pipeline with a depth greater than 6% of the pipeline's diameter;
- An area of general corrosion with a predicted metal loss greater than 50% of nominal wall;
- Predicted metal loss greater than 50% of nominal wall that is located at a crossing of another pipeline, or is in an area with widespread circumferential corrosion, or is in an area that could affect a girth weld;
- A potential crack indication that when excavated is determined to be a crack;
- Corrosion of or along a longitudinal seam weld; and,

- A gouge or groove greater than 12.5% of nominal wall.

4.3 State Fire Marshall Data Request

The State Fire Marshal provides regulatory and enforcement authority over intrastate hazardous liquid pipelines and implements the Federal Hazardous Liquid Pipeline Safety Act. State Fire Marshall data relevant to the Project include geographic information files (GIS or Shapefiles), pipeline inspection data, and pipeline operator data submittal (PSD-101) forms. Data requests and discussion with the State Fire Marshall commenced in September 2018. Correspondence is summarized below.

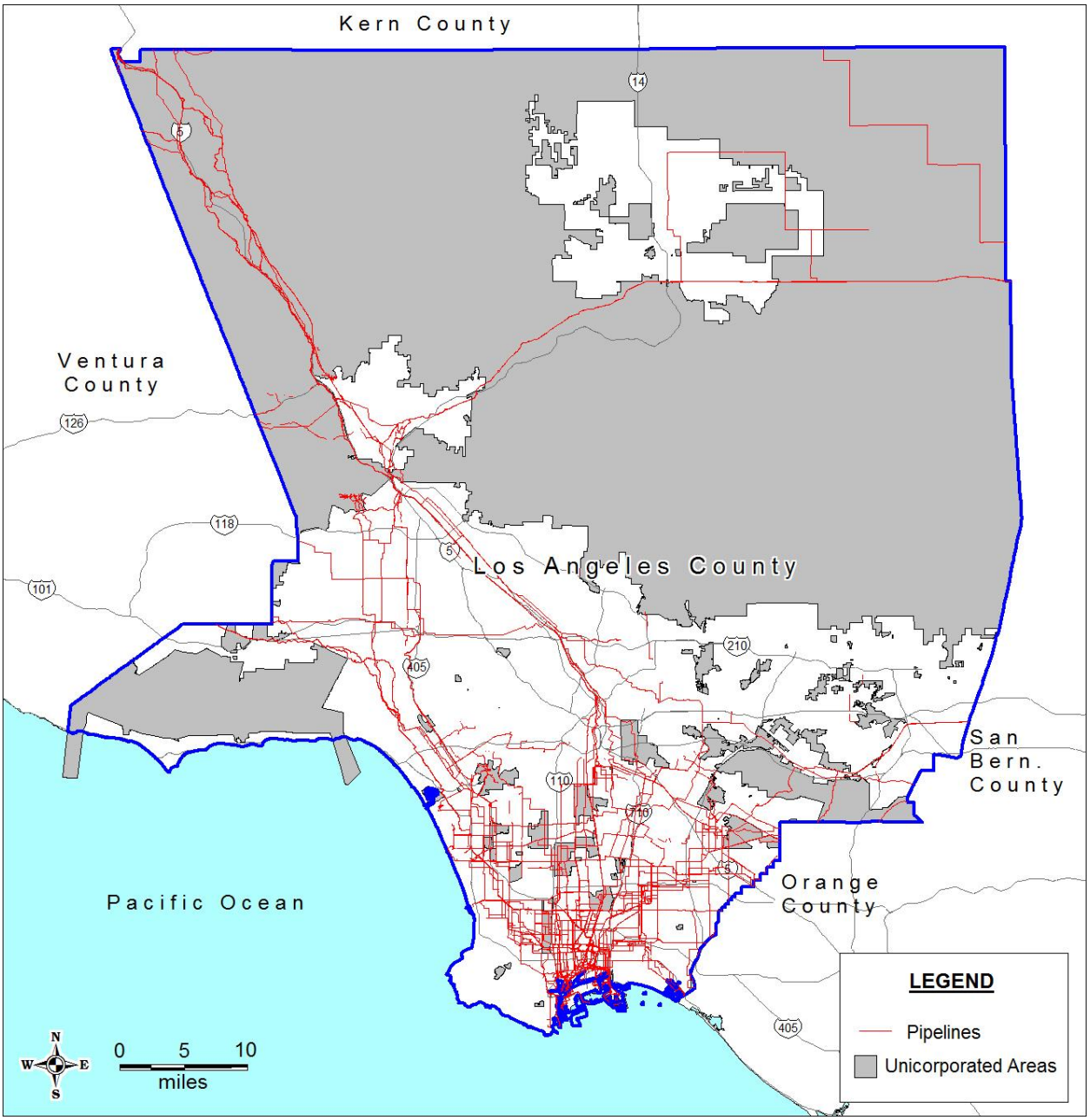
- 9/19/2018 – Project Staff meeting request sent to CalFire.
- 11/6/2018 – Response received from CalFire stating the Public Records Act (PRA) process is required for CalFire information.
- 11/7/18 – Project Staff clarification correspondence sent to CalFire.
- 11/8/18 – Project Staff sent PRA request with requested data detail sent to CalFire.
- 11/15/18 – Request for conference call received from CalFire.
- 11/19/18 – Request from CalFire for additional time to address PRA request.
- 11/20/18 – Conference call with Project Staff and CalFire on data request.
- 11/30/18 – Background detail on data requested received from CalFire, no data received.
- 12/3/18 – Request and notice that the PRA data request time limit expired sent to CalFire.
- 12/10/18 – Project Staff request for follow-up on PRA data extension request sent to CalFire.
- 12/10/18 – Response but no data received from CalFire.
- 12/11/18 – Clarification about limiting scope of data request to unincorporated County sent to CalFire.
- 12/13/18 – CalFire response for more time on data request scope received.
- 1/30/19 – Telecon with Project Staff and CalFire on PRA request.
- 2/5/19 – Project Staff request for first subset of pipeline data sent to CalFire.
- 2/8/19 – Response received from CalFire stating first set of pipeline data will be provided middle March 2019.
- 4/15/19 – Project Staff received a first set of pipeline data from CalFire.
- 6/25/19 – Project Staff request for a second subset of pipeline data sent to CalFire.
- 8/8/19 – Project Staff received correspondence from CalFire stating a second set of pipeline data is available.
- 8/2/19 – Telecon with Project Staff and CalFire on PRA request.
- 10/23/19- Project staff received PSD-101 annual report submittals for pipelines twelve inches and greater.
- 8/19/20 – Project staff received PSD-101 annual report submittals for pipelines between eight and twelve inches in diameter.

The PSD-101 forms contain current key information on pipeline specifications, pipeline commodities, integrity testing, hydrostatic pressure testing, leak detection system, and corrosion control. This set of data has been reviewed and is discussed in Section 4.5 below.

4.4 NPMS Pipeline Data

The National Pipeline Mapping System (NPMS) is a Geographic Information System (GIS) data set that contains the location and attributes of hazardous liquid and gas pipelines, liquified natural gas (LNG) plants, and tank farms. Data is required to be reviewed by operators annually and must be re-submitted if any of the data has changed. Some NPMS data is available to the public and additional specific data is available to government agencies. A data set was obtained in November 2018 for Los Angeles County containing a mapping and pipeline data set and was reviewed and mapped for the unincorporated County. A general map of the pipelines from the NPMS data is shown in Figure 4-1. Note that detailed locations for pipelines are not presented in this report for homeland security and safety reasons.

Figure 4-1 Los Angeles County NPMS Pipelines



Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Based on the NPMS data there are 1,400 hazardous liquid and gas pipelines managed by 20 different operators located in the unincorporated areas of Los Angeles County. For Los Angeles County as a whole, the NPMS data lists 4,342 pipelines with 42 operators. Table 4.1 lists the pipeline operators and number of pipelines for each in the unincorporated LA County. The database provides the status of the pipelines as "in service", "idle", "abandoned", or "retired" as follows:

- In Service – currently transports hazardous liquids or natural gas;
- Idle – pipeline is maintained such that it may be brought back into service;
- Abandoned – pipeline is permanently removed from service; and,
- Retired – removed from service and no longer maintained but not permanently abandoned.

Pipelines in Table 4.1 below identified as abandoned by the operator are identified as permanently removed from service in the NPMS database. The 1,031 pipelines in service, idle, or retired in the unincorporated LA County have an identified designated operator. Table 4.2 provides the number of pipelines for each category of pipeline.

Table 4.1 Unincorporated LA County Hazardous Liquid and Gas Pipeline and Operators

Pipeline Operator	Number of Pipelines
Southern California Gas Company	811
Abandoned	369
Chevron Pipeline Company	64
Crimson Pipeline L.P.	28
Plains Pipeline L.P.	24
Shell Pipeline CO., L.P.	14
Torrance Basin Pipeline Company LLC	14
Phillips 66 Pipeline LLC	11
Torrance Valley Pipeline Company LLC	11
SFPP, LP	10
Plains Marketing, L.P.	9
Torrance Pipeline Company LLC	8
Breitburn Management Company, LLC	7
Tesoro SoCal Pipeline Company LLC	7
Paramount Petroleum Corp	5
City of Vernon	2
DOD Defense Energy Support Center	2
West Coast Terminal Pipeline (WCTP)	2
Air Products and Chemicals Inc	1
CalNev Pipeline CO.	1
Total	**1,400**
Total less Abandoned	**1,031**

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Table 4.2 Unincorporated LA County Pipelines by Service Status

Service Category	Number of Pipelines
In Service	935
Idle	79
Retired	17
Permanently Abandoned	369
Total	**1,400**

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Pipelines by commodity and size are shown, less the permanently abandoned pipelines, in Tables 4.3 and 4.4. The NPMS data set lists 3,190 miles of hazardous liquid and gas pipelines in LA County with approximately 656 miles of those pipelines in the unincorporated LA County areas. It should be noted these totals do not include lengths for So Cal Gas pipelines as this data was not included in the NPMS data set. Table 4.3 provides the number of miles associated with each commodity type.

Table 4.3 Unincorporated LA County Pipelines by Commodity Type

Commodity	Number of Pipelines	Miles of Pipeline[1]
Crude Oil	147	202.6
Empty Gas	0	0
Empty Liquid	0	0
Fuel Grade Ethanol	0	0.0
Hydrogen Gas	1	1.0
Liquefied Petroleum Gas	0	0.0
Natural Gas[1]	821	221.1
Other Gas	0	0.0
Product (Non-Highly Volatile Liquid)	62	91.5
Totals	**1031**	**656.5**

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.
1. National Pipeline Mapping System (NPMS) data set did not contain mileage data for So Cal Gas pipelines.

Table 4.4 Unincorporated LA County Pipelines by Diameter

Pipeline Diameter (Inches)	Number of Pipelines
20 to 24	20
18 to <20	0
16 to <18	23
14 to <16	11
12 to<14	23
10 to <12	21
8 to <10	36
6 to <8	33
4 to <6	34
Less than 4	8
No Data1	822
Total	1031

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.
1 The majority of these pipelines (811) are SoCal Gas Company pipelines with no size detail in data set.

4.5 California State Fire Marshall (CSFM) Pipeline Data

Annual pipeline operator reports (CSFM Form PS-101 California Intrastate Pipeline Operator Reports) contain data and validated inspection results from the previous calendar year for each pipeline under the CSFM jurisdiction. The annual PSD-101 reporting requirement began in 2017 under Senate Bill (SB) 295 (Government Code §51015.1(a) and Title 19, California Code of Regulations, Chapter 14, Article 2). SB 295 mandated the CSFM adopt regulations and conduct annual inspections to reduce the potential for jurisdictional hazardous liquid pipeline accidents in California. Note that the pipeline data received does not include pipeline location data or GIS digital files as the CSFM does not release that type of information for homeland security reasons.

Project staff received PS-101 reports in October 2019 for pipelines with diameters twelve inches and greater located in unincorporated LA County. In August 2020, PS-101 data for pipelines with diameters between eight and twelve inches was received from the CSFM. The data in the PS-101 reports is organized by CSFM inspection units, also known as inspection modules, which are assigned by the CSFM. A single pipeline in the CSFM data set may have many inspection units and therefore a direct comparison between the NPMS and the CSFM data sets is not possible. Review of the initial set of PS-101 reports confirms pipeline operators are conducting integrity testing as required and as summarized in Table 4.5 below.

Table 4.5 CSFM Pipeline Inspection Summary – PSD-101 2018/2019 Reporting Years

CSFM Line ID	Diameter Inches	Product[1]	Inspection Type	Last Inspection	Next Inspection	Last Hydrostatic Test
0206	24	Crude Oil	In Line	11/14/2017	11/14/2022	6/30/1997
1069	24	Crude Oil	No Data	3/19/2013	3/19/2018	11/16/1999
0026	20	Refined Products	In Line	2/18/2016	2/18/2021	6/29/2010
0454	20	Refined Products	In Line	2/11/2015	2/20/2020	5/14/1992
0987	20	Crude Oil	In Line	4/24/2019	4/24/2019	Multiple
0988	20	Crude Oil	In Line	12/18/2017	12/18/2018	11/22/1998

Table 4.5 CSFM Pipeline Inspection Summary – PSD-101 2018/2019 Reporting Years

CSFM Line ID	Diameter Inches	Product[1]	Inspection Type	Last Inspection	Next Inspection	Last Hydrostatic Test
1176	20	Crude Oil	No Data	No Data	3/29/2022	3/29/2017
0100	16	Refined Products	In Line	5/31/2017	5/31/2020	8/17/1983
0104	16	Crude Oil	No Data	12/2/2014	12/2/2019	1/25/2000
0233	16	Crude Oil	In Line	5/19/2015	5/17/2020	9/16/1988
0233	16	Crude Oil	In Line	6/11/2009	6/3/2019	1992
0266	16	Refined Products	No Data	4/29/2016	4/26/2021	No Data
0390	16	Crude Oil	No Data	7/18/2016	7/18/2001	9/23/2003
0800	16	Crude Oil	No Data	7/12/2016	7/12/2021	No Data
1062	16	Crude Oil	No Data	6/4/2016	6/4/2018	10/30/2003
1102	16	Crude Oil	No Data	12/9/2014	12/9/2018	1/24/2011
1103	16	Crude Oil	No Data	12/9/2018	12/9/2018	1/24/2011
1104	16	Crude Oil	No Data	12/9/2014	12/9/2014	1/25/2000
1266	16	Crude Oil	In Line	8/13/2017	2/11/2019	1/17/1999
0125	14	Crude Oil	No Data	10/17/2015	1/17/2020	3/10/2016
1034	14	Crude Oil	No Data	No Data	No Data	6/17/2009
1323	14	Crude Oil	No Data	8/9/2016	8/9/2021	10/19/2014
1324	14	Crude Oil	In Line	1/24/2017	1/24/2019	8/9/2015
192	12.75	Crude Oil	In Line	2/21/2013	2/20/2018	1993
0042	12	Crude Oil	In Line	4/20/2015	4/20/2020	6/3/2014
0127	12	Refined Products	In Line	4/20/2016	4/20/2019	4/22/2008
0455	12	Crude Oil	In Line	4/20/2015	4/20/2020	6/31/94
0735	12	Refined Products	No Data	5/24/2016	5/24/2021	10/10/2001
1224	12	Refined Products	In Line	5/24/2016	5/24/2021	10/10/2001
0201	10.75	Refined Products	In Line	5/11/2016	5/10/2021	10/13/2016
0166	10	Refined Products	No Data	No Data	12/21/2022	12/21/2017
0339	10	Crude Oil	In Line	1/30/2015	1/30/2020	1/3/2009
0334	10	Crude Oil	In Line	7/19/2015	7/19/2020	No Data
0065	10	Nitrogen	Other	5/12/2009	No Data	No Data
0450	10	Crude Oil	In Line	3/20/2017	3/20/2022	2/11/1994
0458	8-10	Crude Oil	In Line	2/3/2015	2/3/2020	12/7/199
0696	8-10	Jet Fuel	In Line	8/11/2015	8/11/220	No Data
0204	8.68	Crude Oil	Other	No Data	No Data	6/3/2004
0200	8.68	Crude Oil	In Line	6/29/2017	6/24/2019	1/29/20106
0193	8.63	Refined Products	In Line	2/24/2010	No Data	4/4/2014
0027	8	Refined Products	In Line	5/15/2019	5/15/2024	10/21/2014
0030	8	Refined Products	In Line	8/5/2015	8/5/2015	9/18/2014
0033	8	Refined Products	In Line	8/18/2018	8/18/2018	7/17/2013
0041	8	Crude Oil	No Data	No Data	No Data	No Data
0703	8	Crude Oil	No Data	No Data	No Data	No Data
0177	8	Crude Oil	No Data	No Data	No Data	No Data
0862	8	Crude Oil	No Data	No Data	No Data	No Data
0383	8	Crude Oil	No Data	No Data	No Data	No Data

Table 4.5 CSFM Pipeline Inspection Summary – PSD-101 2018/2019 Reporting Years

CSFM Line ID	Diameter Inches	Product[1]	Inspection Type	Last Inspection	Next Inspection	Last Hydrostatic Test
0335	8	Refined Products	In Line	6/2/2017	6/2/2022	1/1/2003
0336	8	Jet Fuel	In Line	4/15/2015	4/15/2020	12/2/1992
0457	8	Refined Products	In Line	3/16/2015	8/27/2019	6/21/2000

Source: CSFM PS-101 Annual Reports (report year 2018 for pipelines 12" and greater, report year 2019 other).
Bold face type font = high priority designation, see Section 4.5.5 below.
1 Refined products include gasoline, diesel, jet fuel, or other refined petroleum product.

As shown in Table 4.5 above, in line testing is the most common method for integrity testing of a hazardous material pipeline. In-line Inspection (ILI) involves the evaluation of pipes and pipelines using "smart pigs" (both tethered and non-tethered) that utilize non-destructive examination techniques to detect and size internal damage. ILI measures and records irregularities in pipelines including corrosion, cracks, deformations, or other defects. Smart pigs are inserted into the pipeline and are pushed along by the flowing product. Hydrostatic testing involves filling the pipe system with a liquid, usually water, which may be dyed to aid in visual leak detection, and pressurization of the line to the specified test pressure. The U.S. Department of Transportation Pipeline & Hazardous Materials Safety Administration requires that hydrostatic testing of hazardous liquid pipelines to at least 125% of the maximum operating pressure (MOP), for at least 4 continuous hours, and an additional 4 hours at a pressure of at least 110% of MOP if the piping is not visible.

Other data derived from the initial set of PSD-101 Annual Reports includes the following as listed in Table 4.6:

- High Consequence Areas. If the pipeline inspection unit sections have the potential to impact a high consequence area (HCA). The U.S. Department of Transportation on-line glossary defines an HCA as *"A location that is specially defined in pipeline safety regulations as an area where pipeline releases could have greater consequences to health and safety or the environment. For oil pipelines, HCAs include high population areas, other population areas, commercially navigable waterways and areas unusually sensitive to environmental damage";*
- Corrosion Protection. The type of corrosion protection (cathodic protection) used on the pipeline inspection unit. Impressed current systems are used on every line in the initial PS-101 data set;
- Leak Detection Systems. If a Computational Pipeline Monitoring (CPM) or Supervisory Control and Data Acquisition (SCADA) system for leak detection is used. Of the inspection unit data sets with information for this category, most pipeline sections with this data utilized a SCADA system. Other pipeline leak detection methods included mass balance and volume balance/line pressure deviation;
- Corrosion Inhibitor Use; and,
- Pipeline Coatings Use.

Table 4.6 CSFM Pipeline Additional Data – PSD-101 2018/2019 Reporting Years

CSFM Line ID	HCA	Corrosion Protection	Leak Detection System	SCADA System	Corrosion Inhibitor	Pipeline Coatings
0206	Yes	Yes	No	Yes	No	Yes
1069	Yes	Yes	No	Yes	Yes	Yes
0026	Yes	Yes	Yes	Yes	Yes	Yes
0454	Yes	Yes	Yes	Yes	No	Yes
0987	Yes	Yes	No Data	Yes	Yes	Yes
0988	Yes	Yes	Yes	Yes	Yes	Yes
1176	Yes	Yes	No	Yes	No	Yes
0100	Yes	Yes	Yes	Yes	No	Yes
0104	Yes	Yes	Yes	Yes	No	Yes
0233	Yes	Yes	No	Yes	No	Yes
0233	Yes	Yes	No	Yes	No	Yes
0266	Yes	Yes	No	Yes	No	Yes
0390	Yes	Yes	Yes	Yes	No	Yes
0800	Yes	Yes	Yes	Yes	No	Yes
1062	Yes	Yes	No	Yes	No	Yes
1102	Yes	Yes	Yes	Yes	Yes	Yes
1103	Yes	Yes	Yes	Yes	Yes	Yes
1104	Yes	Yes	Yes	Yes	Yes	Yes
1266	Yes	Yes	Yes	Yes	Yes	Yes
0125	Yes	Yes	Yes	Yes	No	Yes
1034	No	Yes	Yes	Yes	Yes	No
1323	Yes	Yes	Yes	Yes	Yes	Yes
1324	Yes	Yes	Yes	Yes	Yes	Yes
192	Yes	Yes	No	Yes	No	Yes
0042	Yes	Yes	Yes	Yes	No	Yes
0127	Yes	Yes	No Data	Yes	No	Yes
0455	Yes	Yes	Yes	Yes	No	Yes
0735	Yes	Yes	No Data	No Data	No	No
1224	Yes	Yes	Yes	Yes	No	Yes
0201	Yes	Yes	Yes	Yes	No	Yes
0166	Yes	Yes	No	Yes	No	Yes
0339	Yes	Yes	Yes	Yes	Yes	Yes
0334	Yes	Yes	Yes	Yes	No	Yes
0065	Yes	No Data	No Data	No Data	No Data	Yes
0450	Yes	Yes	No Data	Yes	No	Yes
0458	Yes	Yes	Yes	Yes	No	Yes
0696	Yes	Yes	No	Yes	No	Yes
0204	Yes	Yes	No	No	No	Yes
0200	Yes	Yes	Yes	Yes	Yes	Yes
0193	Yes	Yes	Yes	Yes	No	Yes
0027	Yes	Yes	Yes	Yes	No	Yes
0030	Yes	Yes	Yes	Yes	No	Yes

Table 4.6 CSFM Pipeline Additional Data – PSD-101 2018/2019 Reporting Years

CSFM Line ID	HCA	Corrosion Protection	Leak Detection System	SCADA System	Corrosion Inhibitor	Pipeline Coatings
0033	Yes	Yes	Yes	Yes	No	Yes
0041	Yes	No Data	No Data	No Data	No Data	Yes
0703	No Data	No Data	No Data	No Data	No Data	No
0177	No	No Data	No Data	No Data	No Data	Yes
0862	No Data	No Data	No Data	No Data	No Data	No
0383	No Data	No Data	No Data	No Data	No Data	No
0335	Yes	Yes	Yes	Yes	No	Yes
0336	Yes	Yes	Yes	Yes	No	Yes
0457	Yes	Yes	Yes	Yes	No	Yes

Source: CSFM PS-101 Annual Reports (report year 2018 for pipelines 12" and greater, report year 2019 other).
Bold face type font = high priority designation, see Section 4.5.5.
1 Refined products include gasoline, diesel, jet fuel, or other refined petroleum product.

The data in Table 4.6 is presented to provide pertinent information on pipelines available from the PSD-101 database. The data documents the preventative measures for corrosion monitoring and leak detection for those pipelines. A pipeline that is not undergoing cathodic protection, or that has a substantial amount of corrosion is more likely to leak than other pipelines that do not. Similarly, if a pipeline has a leak detection system is place, it is more likely to identify a problem shortly after it has occurred and, in that fashion, prevent further damage.

4.5.5 High Priority Pipelines

Review of the inspection date data in Table 4.5 indicates a number of pipelines with last inspection dates older than five years (2020 baseline year) or with no data submitted for last inspection date on the PS-101 forms. These pipelines merit follow up review to determine the cause of the lack of recent inspection data; 17 pipelines in the data set meet this criterion (identified in bold font in Table 4.5).

In addition to dated or missing inspection data, the factors outlined in Table 4.6 along with the contents of the pipeline were used to guide the Strike Team in determining pipelines that may warrant further review. One additional descriptor that can be factored in the analysis of risk for pipelines is the operating pressure, however, review of the PS-101 data set indicated the maximum operating pressure for the pipelines ranged from 275 to 1440 pounds per square inch (psi). Therefore, as most of the subject pipelines operate at significant pressure, operating pressure was not used as a screening factor in scoring the pipeline data set for further review.

Pipelines were ranked for further review by assigning a point to each factor that is deficient in Table 4.6 with an additional point for larger sized pipelines and pipelines containing product. Priority is based on the following information (a point for each item that answers a "No"):

- Is the pipeline located outside of a High Consequence Area (HCA)?
- Does the pipeline utilize corrosion protection?
- Does the pipeline have a leak detection system?

- Does the pipeline have a SCADA system?
- Does the pipeline use corrosion inhibitor?
- Is the pipeline coated?
- Pipeline size; and
- Pipeline contents.

In addition to the items in Table 4.6, large pipelines contain larger volumes and therefore have the potential to spill greater amounts of hazardous materials; pipelines 14 inches and larger were assigned an additional point in the ranking system. Pipeline contents were also used in the ranking as the consequences of a crude oil spill on public safety are generally lower than a release of gasoline or jet fuel, or other refined petroleum products, since refined petroleum products can produce flammable vapor clouds more readily. Therefore, pipelines containing products other than crude oil were given an additional point in the scoring system with the exception of the single pipeline in the data set containing nitrogen. Results, with potential scores ranging from zero to eight with higher scores representing a higher potential risk, by pipeline, are presented in Table 4.7.

Table 4.7 CSFM Priority Pipelines – PSD-101 2018/2019 Reporting Years

CSFM Line ID	Priority Score		CSFM Line ID	Priority Score		CSFM Line ID	Priority Score
206	4		1104	2		450	3
1069	3		1266	2		458	3
26	3		125	3		**696**	5
454	4		1034	2		**204**	4
987	3		1323	2		200	1
988	2		1324	2		193	3
1176	4		192	3		27	3
100	4		42	2		30	3
104	3		**127**	4		33	3
233 a	4		455	2		**41**	5
233 b	4		**735**	6		**703**	6
266	5		1224	3		**177**	4
390	3		201	3		**862**	6
800	3		**166**	4		**383**	6
1062	4		339	1		335	3
1102	2		334	2		336	3
1103	2		**65**	6		457	3

Source: CSFM PS-101 Annual Reports (report year 2018 for pipelines 12" and greater, report year 2019 other).
Bold face type font = high priority designation, see Section 4.5.5.

As Table 4.7 above indicates, 19 pipelines (identified in bold font) scored 4 or more on the ranking system due to not operating with certain integrity testing, maintenance, or mitigation measures or no data was available on the PS-101 forms. These 19 pipelines, along with the 17 identified in Table 4.5 resulted in the 28 total pipelines shown in Table 4.8 below (eight pipelines were flagged

in both priority categories). These pipelines warrant further follow up with the CSFM to determine the applicability of additional operating requirements or to obtain the missing data. However, the CSFM has determined that further follow up on these pipelines is outside the scope of the Public Records Act, therefore no further research on these pipelines was conducted (see Recommendations Section below).

Table 4.8 CSFM Priority Pipelines – PSD-101 2018/2019 Reporting Years

CSFM Line ID	CSFM Line ID	CSFM Line ID
41	206	1034
65	233	1062
100	266	1069
104	383	1102
127	450	1104
166	454	1176
177	696	233 a
192	703	233 b
193	735	
204	862	

Source: CSFM PS-101 Annual Reports (report year 2018 for pipelines 12" and greater, report year 2019 other).

4.6 Case Study - Pipelines

As discussed in Section 3.6, certain events occurred during the Strike Team project that are applicable to the subject matter and warrant review. These incidents provide recent and real life examples of some of the challenges that arise from addressing past oil and gas activities and present the opportunity for a "lessons learned" type of review. A recent event involving a leaking gas pipeline is presented below.

4.6.1 Signal Hill Gas Explosion

On November 5, 2020 a gas explosion occurred at a residence on Ohio Avenue in Signal Hill. The cause of the gas explosion was determined to be a leak from an eight inch abandoned orphan wet gas pipeline. The gas from the leaking pipeline entered the home through the wall space of the home and was ignited by a hot water heater pilot light. Subsequent to the incident, a Health and Safety Plan was prepared pursuant to the direction of the County Fire Department Health Hazardous Materials Division and the County Public Health Department. The Health and Safety Plan documented that six previous environmental assessments and investigations have been completed for the Hilltop area of Signal Hill where the explosion occurred including several for the development of the existing residential homes. The Health and Safety Plan also includes a review of the previous site assessment data and provides the following conclusions:

- The site area has contaminated soil with high concentrations of volatile organic compounds and methane;
- The contaminated soil at the site does not appear to be impacted from crude oil or tank bottoms; and,

- A methane assessment or soil vapor assessment was not done prior to the development of the residential homes.

Air monitoring was conducted at the site by the City of Signal Hill and County Public Health at interior residential locations and exterior locations near 2100 Ohio Avenue and 2749 East 21st Street. Signal Hill Petroleum and the City of Signal Hill excavated and removed the leaking pipeline and installed a passive ventilation pipe system to mitigate any potential gas issues. Based on the air monitoring results and the installation of the vent system, the County Fire Department Health Hazardous Materials Division determined the incident mitigated and completed on January 25, 2021.

4.6.2 Wilmington Pipeline Oil Spill

On Monday, March 17, 2014, approximately 1,200 gallons of crude oil seeped out of an underground pipeline onto a residential street in the City of Wilmington, California. Officials suspected that a magnitude-4.4 earthquake in Westwood as a possible cause. Hazmat units with the Los Angeles County Fire Department responded to reports of oil flowing through cracks in the asphalt on the 1200 north block of Neptune Avenue at 7:00 p.m., according to fire officials.

Phillips 66 inherited the involved pipeline through its $7 billion purchase of refiner Tosco Corp. in 2001. As part of the deal, Phillips took over Tosco's Wilmington oil refinery and its associated pipelines. In California, intrastate oil and liquid fuel pipelines are regulated by the California Fire Marshal's pipeline safety division. Phillips 66 said the pipeline had been classified as "idle". However, California pipeline law and federal regulations from the Pipeline and Hazardous Materials Safety Administration (PHMSA) only recognize pipelines as "active" or "abandoned". In a later statement, Phillips 66 described the damaged pipeline as being "out of service" and that it was being maintained "in compliance with [federal] requirements for this type of pipeline", yet it never qualified for that designation despite being withdrawn from service in 1998.

California pipeline regulations require out-of-service pipelines to be cleaned out and refilled with water or inert gas. However, Phillips 66 owned the pipeline for 13 years and never verified that the 10-inch, three-mile connector pipeline was emptied of oil or sealed off properly.

The pipe that leaked was estimated at about seven feet below the ground. Crews reportedly drilled small holes in the street to get a better look at the seepage in the neighborhood, which is adjacent to the Wilmington Oil Field – one of the largest oil fields in the continental United States – and near several refineries. It was determined that oil did not leak into the groundwater or local water source.

According to the Los Angeles Police Department, the seeping oil did not pose a threat to the public. Despite odor complaints, authorities received no medical calls, and tests showed no health hazards. Local residents were notified of the incident and were allowed access to and from their homes, but the street was otherwise closed. Phillips 66's crews steam cleaned the street and repairs were completed in a week.

4.6.3 City of Downey Gas Leak

On Thursday, April 22, 2021, at 10:30 a.m., a natural gas leak was reported at the corner of Stewart and Gray Road and Rives Avenue in the City of Downey, California, according to the Southern California Gas Company (SoCalGas). SoCalGas determined that a third-party contractor cut a gas main in a residential area. Downey's fire and police departments arrived at Stewart and Gray Road and Rives Avenue at 10:32 a.m. SoGalGas responded shortly after and worked with first responders to stop the flow of gas from the severed six-inch main line, while a stream of water from a firehose prevented any possible flames from igniting. There were no immediate reports of damage or an explosion.

At 3 p.m., SoCalGas estimated it would take four hours to cap the leak. At about 8:30 p.m., the Downey Fire Department estimated repairs would take another eight hours. Police secured the area and road closures were in place on Stewart and Gray Road from Paramount Boulevard to Rives Avenue. A 300-foot evacuation zone was set up around the leak. Approximately 40 households were affected by the evacuation orders. No injuries were reported, and shelter was provided for those evacuated.

An emergency alert was issued to cellphones about 12:35 p.m., notifying L.A. County residents to avoid the area. The City of Downey was testing a new emergency notification system that was intended to notify the residents of Downey but inadvertently notified the entire county, resulting in unnecessary alarm and calls to the authorities by concerned citizens throughout the region.

Residents were advised to close windows and doors, run an air purifier, and avoid going outside. SoCalGas reminded residents and business owners to call 811 before digging in a garden or at a construction site to avoid possible injury or damage to hidden utility lines.

4.7 Recommendations

As detailed above, obtaining information for the State Fire Marshall's office was problematic and required multiple specific PRA requests. Even after information was received, the information appeared incomplete, and the Strike Team was unable to ascertain the status of some of the pipelines reviewed. In some cases the inspection records were not up to date as required by the regulations, which mandate yearly inspections. The following recommendations are designed to ensure that the County is able to track the inspection records for the pipelines within the unincorporated areas.

4.7.1 Requirement for Pipeline Inspection Records

As noted above, it is important for the County to have up to date inspection records for pipelines within the County. To that end, the County should require that pipeline inspection records be provided by operators as part of permits, franchise agreement or as part of the new oil and gas ordinance currently being prepared by the County.

Requirements should be as follows:

Operators should provide the appropriate County agency with the exact location, size, description and date of installation of all existing or proposed pipelines, mains, transmission lines, laterals,

and service pipes that are equal to or greater than three inches in diameter, and all valves within the County unincorporated areas.

Pipeline Inspections and Test Results. An Operator shall test all pipelines yearly as required by the State Fire Marshal or other state or federal agency with jurisdiction over the pipeline or by any applicable law and must make available for inspection by the Public Works Department the results of all pipeline inspections and pipeline tests that are required by the State Fire Marshal and by all applicable laws within sixty (60) days of the inspections.

4.7.2 Standards for Pipelines

In addition, the County should consider requirements for pipelines within the oil and gas ordinance to include language as follows:

The operator shall comply with the following provisions related to pipelines throughout operation of an oil or gas site:

4.7.2.1 Pipeline Installations and Use

A. Pipelines shall be used to transport oil and gas off-site to promote traffic safety and air quality, unless it can be demonstrated to the satisfaction of the appropriate County agency that a pipeline is infeasible.

B. The use of a pipeline for transporting crude oil or gas may be a condition of approval for expansion of existing facilities or construction of new facilities unless it can be demonstrated to the satisfaction of the appropriate County agency that a pipeline is infeasible.

C. New pipeline corridors shall be consolidated with existing pipeline or electrical transmission corridors where feasible, unless there are overriding technical constraints or significant social, aesthetic, environmental or economic reasons not to do so, as approved by the Petroleum Administrator.

D. New pipelines shall be routed to avoid residential, recreational areas, and schools if possible. Pipeline routing through recreational, commercial or special use zones shall be done in a manner that minimizes the impacts of potential spills by considering spill volumes, durations, and projected spill paths. New pipeline segments shall be equipped with automatic shutoff valves, or suitable alternatives approved by the appropriate County agency, so that each segment will be isolated in the event of a break.

E. Upon completion of any new pipeline construction, the site shall be restored to the approximate previous grade and condition. All sites previously covered with vegetation shall be reseeded with the same or recovered with the previously removed vegetative materials and shall include other measures as deemed necessary to prevent erosion until the vegetation can become established, and to promote visual and environmental quality, unless there are approved development plans for the site, in which case re-vegetation would not be necessary.

F. Gas from wells shall be piped to centralized collection and processing facilities, rather than being flared, to preserve energy resources and air quality, and to reduce fire hazards and light sources, unless the AQMD approves the flaring of gas during the temporary operation of a well. Oil shall also be piped to centralized collection and processing facilities, in order to minimize land use conflicts and environmental degradation, and to promote visual quality.

4.7.2.2 Pipeline Inspection, Monitoring, Testing and Maintenance

A. Operators shall visually inspect all aboveground pipelines for leaks and corrosion on a monthly basis.

B. The operator shall install a leak detection system for all offsite DOT regulated oil and gas pipelines. The leak detection system for oil shall include pressure and flow meters, flow balancing, supervisor control and data acquisition system, and a computer alarm and communication system in the event of a suspected leak. The leak detection system for gas pipelines shall include pressure sensors.

C. Pipeline abandonment procedures shall be submitted to the appropriate County agency for review and approval prior to any pipeline abandonment.

D. Copies of pipeline integrity test results required by any statute or regulation shall be maintained in a local office of the operator and posted online on the same website that provides the monitoring results for five years and shall also made available to the appropriate County agency, upon request. The appropriate County agency shall be promptly notified in writing by the operator of any pipeline taken out of service due to a test failure.

5.0 Oil and Gas Storage Facilities

Oil and gas storage facilities can present risk to the community through accidental releases of materials and routine air emissions of toxic pollutants. Oil and gas storage facilities are facilities that are not included in the oil production category (which includes wells and produced crude oil and gas storage). The category of oil and gas facilities includes a large range of facility types that could store flammable, toxic or explosive materials that could cause risks to the public if released. Long-term carcinogenic or chronic impacts, such as health impacts caused by air emissions or groundwater contamination, are not addressed in this report.

5.1 Facility Listings in TRI

Oil and gas storage facilities were examined utilizing the EPA Toxic Release Inventory (TRI) data, which includes information in the industry type, the amount of chemicals stored onsite and the facility information in addition to toxic material release inventories. This information was compiled for Los Angeles County and the unincorporated areas for petroleum facilities, chemical facilities and for petroleum bulk storage facility industry types in order to encompass all potential oil and gas storage locations.

5.2 Facility Listings in CERS

The California Environmental Reporting System (CERS) is a database system that is utilized by facility and first responders in California to enter data about their facilities and allow for a lookup of a facilities hazardous materials inventory. The CERS database system also includes a facilities Hazardous Materials Business Plan (HMBP). The DRP gained access to the CERS system as a regulator-responder and was able to look up specific facilities to determine their current hazardous material storage status. Details in the CERS system includes the facility location, owner information, contact information and a hazardous materials inventory summary. The TRI facilities were queried to determine the status in the CERS system, and the CERS system was also reviewed for the unincorporated areas for additional facilities that may not have been listed in the TRI database. This allowed for the addition of additional facilities to the TRI data and to refine the hazardous material quantities in the TRI data.

The CERS system classifies materials at facilities into the following areas: flammable liquids, flammable gasses, flammable solids, toxic gasses, other toxic substances, oxidizers, corrosives, explosives, others.

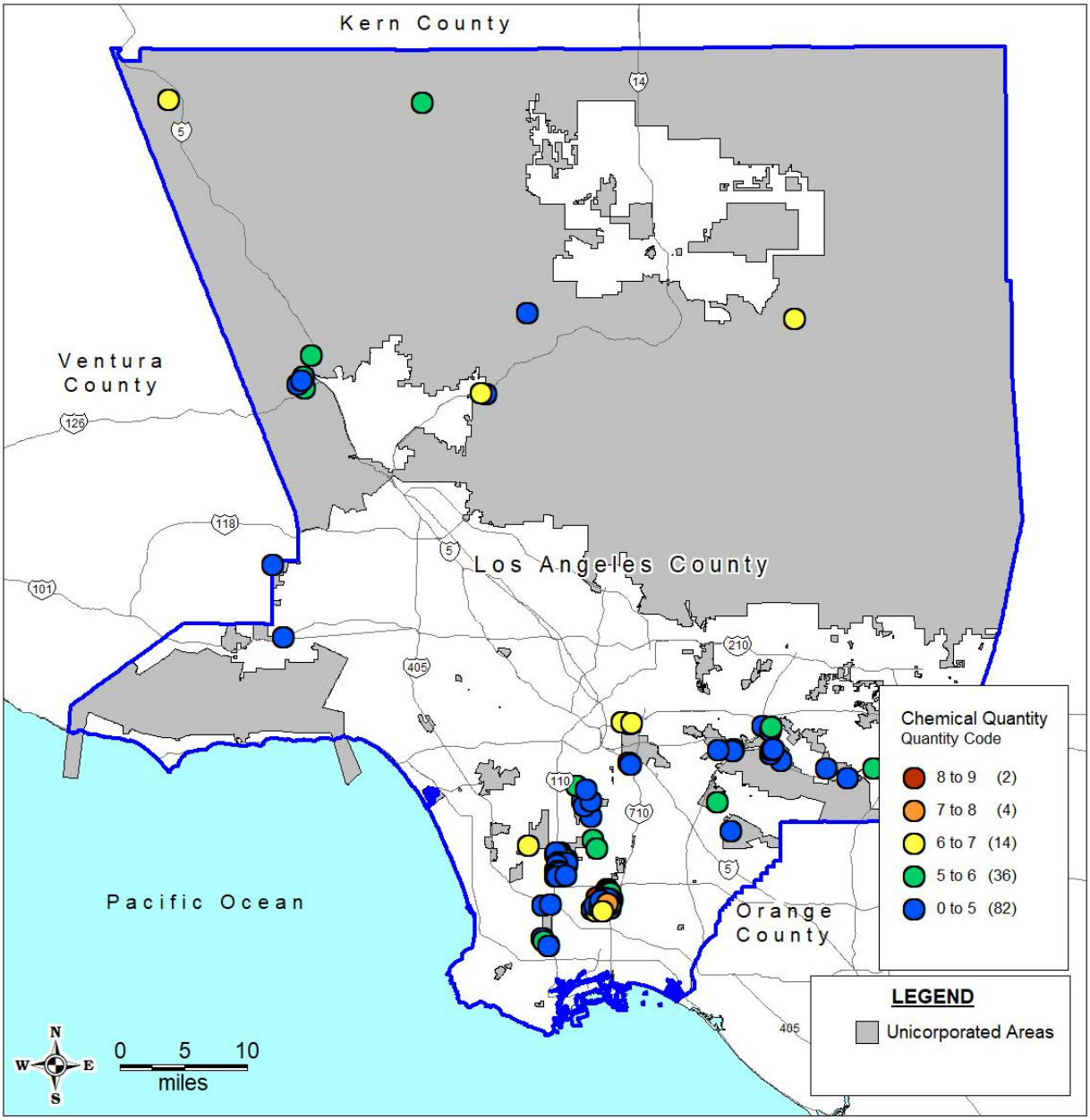
Table 5.1 shows the listing of the facilities with the largest inventories. Figure 5-1 shows the location of potential oil and gas facilities in the unincorporated areas of Los Angeles County.

Table 5.1 Facilities with the Largest Quantity of Chemicals

Facility Name	City	Materials
Pacific Terminals - Dominguez Hills Pump Station	Compton	Flammable Combustible Liquids
Phillips 66 Los Angeles Terminal	Los Angeles	Flammable Combustible Liquids Other
General Petroleum	Rancho Dominguez	Other
Torrance Valley Pipeline Company LLC - Newhall Station	Valencia	Flammable Combustible Liquids
Alflex Corp Distribution Center	Rancho Dominguez	UN
American Racing Equipment Inc	Rancho Dominguez	UN
American Racing Custom Wheels	Rancho Dominguez	UN
Interplastic Corp	Hawthorne	Flammable Combustible Liquids Other
National Cement Co	Lebec	Other
Clean Harbors	Rancho Dominguez	Other
LA DWP Castiac Power Plant	Castaic	Other
Universal Studios LLC	Universal City	Other
Plaskolite West LLC	Compton	Flammable Combustible Liquids
Apple Plastics Inc	Rancho Dominguez	Other
Holliday Rock-Palmdale	Littlerock	Other
Valencia Water Reclamation Plant	Valencia	Other
A&A Ready Mixed Concrete Inc	Gardena	Other
A&A Ready Mixed Concrete Inc	Gardena	Flammable Combustible Liquids Other
Salon Centric	Valencia	Flammable Combustible Liquids Other
Crossfield Products Corp	Rancho Dominguez	Other

Source: TRI Database with over 1 million pounds for industry codes 324 Petroleum & Coal Products, 325 Chemicals, and 4247 Petroleum and Petroleum Products Merchant Wholesalers plus CERS data. UN = unknown

Figure 5-1 Potential Oil and Gas Storage Facilities



Notes: Chemical quantities are designated as: 5=greater than 100,000 pounds; 6=greater than 1 million pounds; 7= greater than 10 million pounds; 8 greater than 100 million pounds and 9=greater than 1 billion pounds.
Figure based on EPA Toxic Release Inventory data.

5.3 Facilities and Census Data

The facility locations were correlated with census data to identify those facilities that are in populated areas. Figure 5-2 shows the facilities and the census data population densities. Table 5.1 shows the number of facilities located in different population density areas. Facilities that are located within 500 feet of higher density areas are also classified as being associated with those higher density census blocks.

Figure 5-2 Potential Oil and Gas Storage Facilities and Census Data

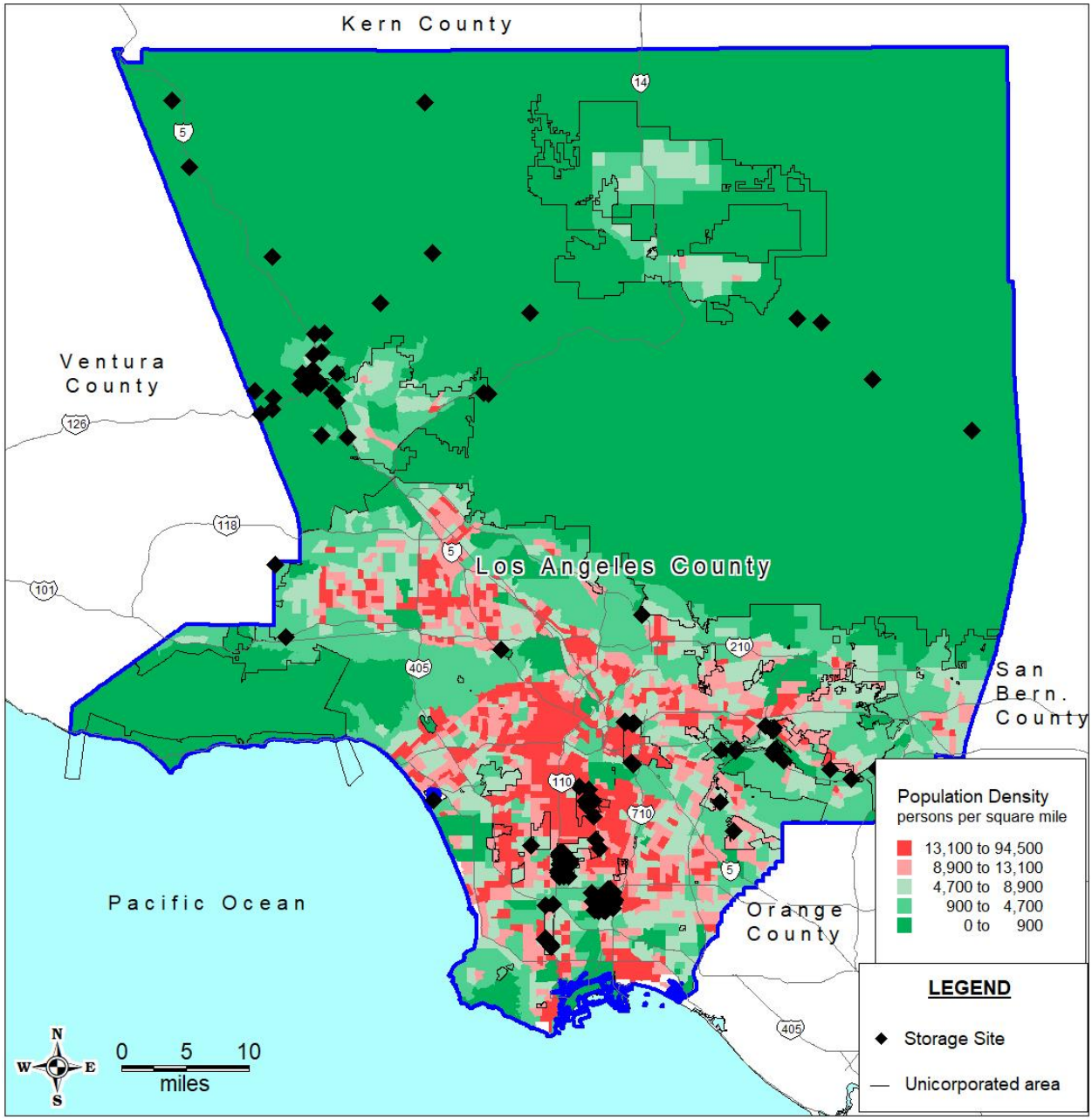


Figure based on EPA Toxic Release Inventory, CERS data and 2010 U.S. Census Bureau data.

Table 5.2 Facilities and Census Data Population Densities

Population Density	Number of Facilities	Density Rank
Less than 1,000 persons/square mile	86	0
More than 1,000 persons/square mile	91	2
More than 5,000 persons/square mile	43	4
More than 10,000 persons/square mile	27	6
More than 15,000 persons/square mile	16	8

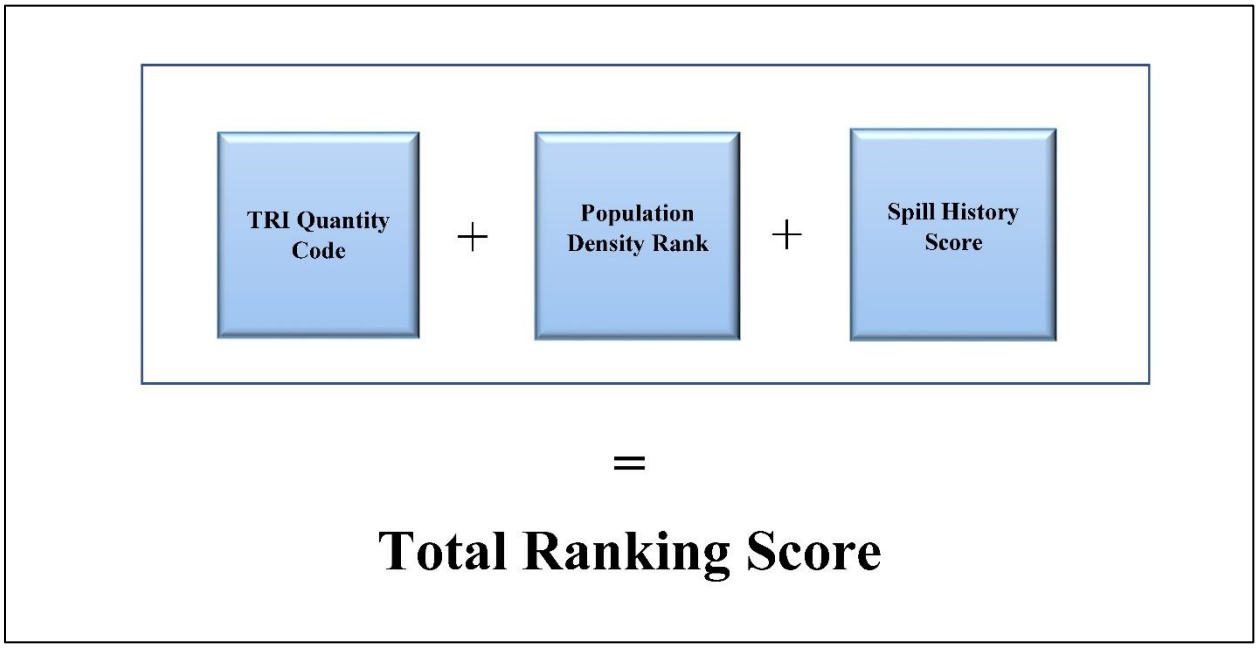
5.4 Facilities by Spill History

The Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA) and California law require responsible parties to report hazardous material releases if certain criteria are met. The California Office of Emergency Services (OES) maintains a database of spills in California. While this spill database does not generally maintain GIS reference information or facility name, address matching was reviewed for spills over the last 5 years. Of the facilities identified from the TRI and CERS systems, 17 facilities experienced spills in the last 5 years.

5.5 Facilities Ranking

Based on the materials quantity and the census tract population density, the facilities were ranked by adding together the quantity code, the census tract population density rank as shown in Table 5.2 and a score if there has been a spill in the last 5 years (0 for none, 5 for maybe and 10 for yes). The highest ranked facilities will therefore have a high quantity of materials located in high population density areas and have a history of some spills. These facilities are those that, because of the amount of materials stored, may present a higher frequency of releases of materials. If releases were to occur, due to the higher population densities, the probability of affecting the public would be higher. In addition, if there is a history of spills, then this also is an indication of the potential for a higher frequency of release of materials to the environment. A low-ranking facility would have less materials located in low population density areas and not have a spill history. A ranking schematic is shown in Figure 5-3.

Figure 5-3 Facility Ranking Schematic



The ranking for the top facilities is shown in Table 5.3.

Table 5.3 Facilities Ranking: Top Facilities

Facility Name	Facility Rank Score
BOWMAN PLATING CO INC	23
HONOR RANCHO	21
LEKOS DYE & FINISHING INC	21
PRECISION SPECIALTY METALS INC	20
GEORGE INDUSTRIES	20
AMERICAN POLYSTYRENE CORP	18
INTERPLASTIC CORP	18
PACIFIC SINTERED METALS	17
RYDER TRUCK RENTAL #0569	17
LA DWP CASTIAC POWER PLANT	16
CROSSFIELD PRODUCTS CORP	16

5.6 Facility Materials Classifications

The initial review of potential facilities utilizes the EPA TRI database and an initial review of the CERS database. More detailed information was obtained from the fire department on each of the top 40-50 ranked facilities in terms of the specific chemicals stored at each site, the population density in which the facility is located and the history of spills. The chemicals at these facilities where then screened related to the EPA list of lists (40 CFR Part 302 and Table 302.4), the

California Code of Regulations (Appendix A to Section 5189 - List of Acutely Hazardous Chemicals, Toxics and Reactive) and the EPA ATF listing of Explosive Chemicals.

In addition, for some facilities the more detailed Fire Department submission information was reviewed to determine the extent to which materials are stored in large quantities or dispersed throughout the facility, and if storage locations on a large property are located close to nearby public receptors. A review of the detailed Universal Studios facility fire department submissions, for example, including maps and details on the specific materials storage type (such as paint in many small paint cans as opposed to one single inventory), allowed for a better determination of the risk levels. In the case of Universal Studios, although the total inventory was high (as indicated in Table 5.1), the risk was determined to be low and they were eliminated from the ranking process.

Table 5.4 lists the details on the facilities that rank the highest.

Of the facilities with detailed information, there were 10 facilities that stored acutely hazardous materials and 9 facilities that stored explosive materials. Note that the facilities with the largest inventories do not necessarily have any acutely hazardous materials, such as the Pacific Terminal in Compton, or the Phillips 66 Terminal in Los Angeles, or the Interplastic Corp facility in Hawthorne, none of which store acutely hazardous materials. These facilities have large inventories (over 10 million pounds of materials at each facility) of flammable materials and could cause large fires with resulting smoke and thereby resulting in impacts, but do not maintain inventories of acutely hazardous materials that could be released and cause impacts to nearby neighborhoods.

Table 5.4 Facilities Detailed Inventory Data

Facility Name	City	Total Inventory, pounds	Top Materials	Acute Materials	Explosive Materials
A&A Ready Mixed Concrete INC	Gardena	47,951	sika, lehigh portland cement	None	None
A2Z Plating	Los Angeles	3,329	oils, antifreeze	None	None
Aerospace Dynamics INTL INC	Valencia	473,387	coolant, oils, propane	None	None
B & C Plating CO	Los Angeles	102,382	zinc, nickle metal plating, metal bisulfides	None	None
Bowman Plating Co Inc	Compton	407,333	sulfuric acid, chromic acid, sodium hydroxide, rioline 909, nitric acid, deoxidizer lnc, nitric acid, anodal m3-1, alodine 1200, sodium dichromate, sodium bicarbonate	Nitric Acid, Hydrofluoric Acid	None
Caltrans-Altadena	Altadena	337,778	sealant, asphalt, diesel fuel	None	None
Crossfield Products CORP	Rancho Dominguez	726,206	silicon dioxide, calcium carbonate, silica sand, pigment, vinyl acetate monomer, sodium hydroxide, aluminum calcium silicate, portland cement, magnesium oxide	Formaldehyde, ammonia	None
Fralock	Valencia	385,102	nitrogen, isopropanol	None	None
General Carbon CO	Los Angeles	59,840	petroleum residues	None	None
General Petroleum	Rancho Dominguez	10,688,324	various oils	None	None
George Industries INC	Los Angeles	719,117	sulfuric acid, nitric acid, phosphoric acid, sodium hyroxide solution, propane, nickel acetate	Nitric Acid	Acetone
Honor Rancho - West Energy Operating LLC	Castaic	834,227	alkyl-1-3-propylene-diamine acetate, aliphatic petroleum distillate 90%, methanol, phosphonate salts, methanol, light aromatic naphtha	None	None
Independent Ink INC	Gardena	31,422	solvents	Nitric Acid	Nitrocellulose
Interplastic Corp Thermoset Resins	Hawthorne	13,273,709	liquid nitrogen, styrene monomer, terephthalic acid (ta-22), diethylene glycol, maleic anhydride molten, 2mpd glycol, maleic anhydride molten, propylene glycol, dicyclopentadiene, acetone	None	None
LA DWP Castaic Power Plant	Castaic	1,365,877	distillates (petroleum - naphthenic), distillate (petroleum), hydrotreated light paraffinic, toluene, crystalline silica	None	Acetone
Maxima Enterprises INC	Harbor City	73,715	sulfuric acid, sodium hydroxide, hydrochloric acid	Hydrochloric acid	Acetone, 2-Propanone
Old Country Millwork INC	Los Angeles	148,248	paint, acetylene, chromic oxide	none	Acetone
Pacific Sintered Metals	Los Angeles	217,737	iron, copper, magnesium aluminum silicate, isopropyl, hydroxyalky methacrylate, acetone, alkanes, calcium bis(dinonylnaphthalenesulphonate), silica, crystalline	Chlorine	Acetone
Pacific Terminals	Compton	1,158,276,502	crude oil demulsifier, batteries	none	none
Phillips 66 Los Angeles Terminal	Los Angeles	47,748,691	gasoline, ethanol, diesel	none	none
Power Magnetics	Gardena	236,101	iron, copper, acetylene, argon	none	none

Table 5.4 Facilities Detailed Inventory Data

Facility Name	City	Total Inventory, pounds	Top Materials	Acute Materials	Explosive Materials
Precision Specialty Metals	Los Angeles	1,084,273	hydrofluoric acid, nickel, acrylamide, hydrotreated light paraffinic distillate, sodium hydroxide	Nitric Acid, Hydrofluoric Acid	None
Prime Wheel Corp	Harbor City	3,760	buffing compounds	none	Acetone
Quaker City	Whittier	1,022,680	sulfuric acid, nitric acid	Nitric acid, hydrogen peroxide, hydrochloric acid	Acetone
Silvestri California	Los Angeles	7,244	propane, styrene resin, acetylene	none	Acetone
Sinclair Printing Co	Los Angeles	3,740	press wash, coatings	none	none
Torrance Valley Pipeline	Valencia	11,626,634	crude oil	none	none
V & M Aerospace LLC	Los Angeles	1,149,400	sulfuric acid, hydrofluoric acid, nitric acid	Nitric acid, hydrochloric acid, muriatic acid	none
Weck Laborators Inc	Hacienda Heights	105,437	argon, hydrogen sulfide, ammonia	Hydrogen sulfide, ammonia	none

5.7 Underground Gas Storage Facilities

SoCalGas owns and operates the Aliso Canyon Underground Natural Gas Storage Facility located at 12801 Tampa Avenue, Northridge, California. The Aliso Canyon Facility is adjacent to the community of Porter Ranch. The Facility is the largest natural gas storage field in California and one of the largest in the United States. In addition, SoCalGas also operates an underground storage facility in Playa Vista and in Honor Ranch within the County of Los Angeles. A fourth underground storage facility in Montebello has been permanently shut down. This discussion describes the methane release at Aliso Canyon and the remedies that have been undertaken to prevent future releases at Aliso Canyon and at other gas storage facilities in the County.

On October 23, 2015, SoCalGas discovered a natural gas leak at natural gas storage well SS-25 located at the Aliso Canyon Facility. Initial efforts to stop the leak were unsuccessful. On February 11, 2016, SoCalGas, in coordination with third-party contractors, successfully intercepted well SS-25 with a relief well and stopped the flow of natural gas through the well.

On February 18, 2016, the California Department of Conservation, Division of Oil, Gas & Geothermal Resources ("DOGGR" and now CalGEM) confirmed that well SS-25 had been permanently sealed. After February 18, 2016, various State agencies reported that ambient air quality in the vicinity of the Facility had returned to pre-Incident levels.

During the Incident, nearby residents complained of odors and physiological symptoms such as nausea, vomiting, dizziness, nosebleeds, and headaches. From November 2015 through June 2016, SoCalGas implemented, pursuant to a directive of the Los Angeles County Department of Public Health, a motion brought by the Los Angeles City Attorney, and order of the court, a temporary relocation program for residents in and around Porter Ranch. Residents could choose whether to participate in the temporary relocation program. Over 8,000 households and two schools temporarily relocated as part of the temporary relocation program. The temporary relocation program ended, based upon the position of County officials that it was safe for relocated residents to return home and a requirement that SoCalGas provide interior residential cleaning pursuant to a protocol established by the Department of Public Health for relocated residents who chose to schedule it prior to returning home.

During the temporary relocation program, SoCalGas was required to arrange for the delivery and/or installation of more than 38,000 certified air filtration systems in homes, schools and businesses in and around Porter Ranch at SoCalGas' expense. Prior to the termination of the relocation program, SoCalGas also was required to have over 1,700 homes in Porter Ranch professionally cleaned at SoCalGas' expense. SoCalGas arranged to have the exteriors of more than 1,200 homes and almost 1,000 vehicles cleaned as a result of complaints of brown spots that were alleged to have been associated with the release.

At DOGGR (now CalGEM) direction, SoCalGas conducted an assessment of the design, construction, operation and maintenance of the surface facilities, underground storage wells and reservoir at the Aliso Canyon Facility. SoCalGas implemented a comprehensive safety review at the Facility, pursuant to a March 4, 2016 DOGGR Emergency Order, developed in consultation with the National Laboratories, to verify the mechanical integrity of each well to be returned to service at the Aliso Canyon Facility. The safety review included: (1) noise and temperature logs; (2) casing inspection logs; (3) cement bond logs; (4) multi-arm caliper inspections; and (5) pressure tests. As part of this process, SoCalGas upgraded all operating wells at the Aliso Canyon

Facility with new tubing and packers to flow natural gas solely through the inner tubing, providing a dual barrier of protection to mitigate the potential for an uncontrolled release of natural gas from a well.

SoCalGas also developed and implemented a comprehensive program for monitoring, testing and inspection of the underground storage wells and above-ground facilities at the that includes: (1) additional well patrols; (2) additional scanning of each well using infrared thermal imaging cameras; (3) accelerated leak repairs; (4) enhanced employee and contractor training; and (5) pressure monitors within each operating gas storage well at the Facility to detect pressure anomalies in real time.

CalGEM and CPUC required SoCalGas to complete a comprehensive safety review of all wells at Aliso Canyon. On the first and third Friday of every month, SoCalGas provides CalGEM with an updated well inspection report.

As of March 10, 2020:

- 114 (or 100 percent) of the active wells at Aliso Canyon have completed the first phase of required tests;
- Number of wells with all tests completed – 66
- Number of wells plugged and abandoned – 21
- Number of wells in the process of abandonment – 27

On September 13, 2016, SoCalGas and the Los Angeles County District Attorney entered into an agreement to resolve all criminal allegations brought by the District Attorney's office against SoCalGas relating to the Incident. Pursuant to that settlement, SoCalGas (1) installed and is operating a fence line methane monitoring system at the Facility that provides near real-time and continuous methane monitoring information on a publicly-accessible website: (https://sem.secmcs.com/MethaneMonitoring/); (2) revised and enhanced reporting policies regarding releases or threatened releases of hazardous materials to the Office of Emergency Services, and the applicable Certified Unified Program Agency; and (3) trained employees responsible for leak detection or reporting at all Los Angeles County natural gas storage facilities (Aliso Canyon, Playa del Rey, and Honor Rancho) regarding proper notification procedures in the event of a leak or suspected leak. SoCalGas also agreed, as part of that settlement, to comply with the requirements of DOGGR Emergency Order 1109 and the comprehensive safety review by installing Real-Time Pressure Monitors at each natural gas storage well in operation at the Facility.

On February 25, 2019, the Los Angeles Superior Court approved a settlement agreement with the Los Angeles City Attorney’s Office, the County of Los Angeles, the California Office of the Attorney General, and the California Air Resources Board to resolve all outstanding claims by those government bodies against the company related to the leak. Under that settlement, SoCalGas has contributed $34.1 million to establish the Aliso Canyon Methane Emissions Mitigation Fund to support a portfolio of projects that capture methane from dairy farms and convert that energy into renewable gas for use in transportation, sufficient to mitigate methane emissions from the leak.

As part of the South Coast Air Quality Management District's ("SCAQMD") January 28, 2016 Order for Abatement, SoCalGas implemented enhanced community and agency notification and

reporting procedures related to releases from the Facility. These enhanced notification procedures include when and how SoCalGas will provide notice to specified recipients in the event of a reportable release, as well as associated training, recordkeeping and plan review requirements.

SoCalGas also performed a comprehensive well assessment program at each of its other underground natural gas storage facilities (Playa del Rey, Honor Rancho, and Goleta) to verify the mechanical integrity of each well, including: (1) noise and temperature logs; (2) casing inspection logs; (3) cement bond logs; (4) multi-arm caliper inspections; and (5) pressure tests. SoCalGas was expected to complete this well assessment program at the Playa del Rey, Honor Rancho, and Goleta facilities by the first quarter of 2020. SoCalGas is upgrading all operating wells at its other underground natural gas storage facilities (Playa del Rey, Honor Rancho, and Goleta) with new tubing and packers and flowing natural gas solely through the inner tubing, providing a dual barrier of protection to mitigate the potential for an uncontrolled release of natural gas from a well.

SoCalGas also developed and implemented a comprehensive program for monitoring, testing and inspection of the underground storage wells and above-ground facilities at its other underground natural gas storage facilities (Playa del Rey, Honor Rancho, and Goleta) that includes: (1) additional well patrols; (2) accelerated leak repairs; (3) enhanced employee and contractor training; and (4) pressure monitors within each operating gas storage well at each of its other underground natural gas storage facilities to detect pressure anomalies in real time.

Pursuant to a June 28, 2001, CPUC decision, SoCalGas has ceased using its Montebello facility as an underground natural gas storage facility and has been in the process of disposing of the assets which comprise the Montebello natural gas storage field. At SoCalGas' request, on December 9, 2016, DOGGR rescinded its approval of gas injections into the Montebello facility effective December 31, 2016.

In addition, since the Aliso Canyon release, the State has adopted a number of bills to address issues related to the leak. Among them were requirements for mitigation for the methane leak and effects on greenhouse gasses and climate change; payment of fines and mitigation funds; the development of new regulations by DOGGR (CalGEM) addressing underground storage facilities and the reinjection wells used for that purpose.

In May of 2019, Blade Energy Partners published a report detailing its analysis of the 2015 natural gas leak at SoCalGas' Aliso Canyon Storage Facility. The investigation was conducted at the direction of the California Public Utilities Commission and DOGGR (CalGEM). The report concluded that a rupture in the outer casing of the well occurred on the morning of October 23, 2015, followed hours later by a complete separation of the casing. According to the report, microbial induced corrosion caused the metal in the outer casing to thin, which led to the rupture. Blade also determined that SoCalGas' current practices and new state regulations address most, if not all, of the causes identified in the report.

SoCalGas formed an Aliso Canyon Community Advisory Council (CAC) that consists of residents, business owners, and community leaders from various constituencies from faith-based organizations, the Los Angeles Police Department, the Los Angeles Fire Department, and other stakeholders. SoCalGas proactively updates the Aliso Canyon CAC members on relevant information regarding the facility. SoCalGas also instituted a community notification system for Aliso Canyon where individuals can sign up to be notified of Air Quality and/or Community Notifications.

5.8 Recommendations

Oil and gas facilities chemical inventories are currently overseen primarily by the Fire Department and the HMBP program. The database of chemicals and inventories in the HMBP were utilized in this analysis to identify facilities that could cause potential impacts to the public. The Fire Department conducts inspections every three years of all facilities in order to ensure compliance with the HMBP program. While some material inventories may not be accounted for in the HMBP program, such as temporary storage and transportation (see Section 6.0), the HMBP is generally comprehensive. Continued efforts on the part of the County could include the identification of acutely hazardous or explosive materials and increased scrutiny of facilities handling acutely hazardous or explosive materials potential impacts on the public, for both long-term or temporary storge of acute or explosive materials.

5.8.1 HMBP Data Base

Coordinate with the Fire Department and the HMBP and AQMD 1148.2 database to identify facilities handling acutely hazardous or explosive materials, either on a long-term or temporary basis, in proximity to receptors and conduct periodic inspections, along with the Fire Department HMBP inspection program or as part of an inspection requirement associated with drilling activities, of these facilities to ensure compliance with permit or other materials handling practices and ensure minimizing potential impacts to neighboring public areas.

6.0 Well Drilling and Well Maintenance Chemical Use

One of the Phase I Strike Team findings concerned the use of chemicals for well drilling, maintenance, and workover activities. These materials are not typically included in hazardous materials business plans because they are specific to each well activity, are only brought onsite as required and are not stored onsite. SCAQMD Rule 1148.2 requires reporting of all chemical use for oil or gas drilling, well completion, or well reworks for onshore wells located in the SCAQMD. Examination of this database provides insight into the materials used associated with well drilling activities and if any of these materials present potential hazards to the public. Additional information required by Rule 1148.2 includes:

- Name and contact information of well owner and operator;
- Well name and API number;
- Well location;
- Nearest and type of sensitive receptor within 1,500 feet;
- Project schedule;
- Equipment data; and,
- Volumes and types of dry and fluid materials used.

Chemical specific data for each product used in a well drilling fluid, well rework fluid, or well completion fluid required by Rule 1148.2 includes:

- Identity and purpose;
- Total mass in pounds;
- CAS (Chemical Abstract Service Number);
- Mass of each chemical ingredient;
- Air toxic designation;
- Supplier data; and,
- Trade secret protection if applicable.

6.1 Well Activity

Data from the South Coast AQMD for the period 2016 through July 2021 provided information on the type of well work activities and associated chemical use for wells subject to Rule 1148.2. Table 6.1 lists Rule 1148.2 well activity events for the 2016 through July 2021 time period for the entire Los Angeles County. As shown in Table 6.1, most of the chemical use reported was associated with maintenance acidizing, gravel packing, and well drilling. Maintenance acidizing is not defined in Rule 1148.2, however, most well operators use the term to describe a near-wellbore treatment to remove scale formation that can plug up well perforations. Definitions for these well activities can differ from agency to agency and no comprehensive single source is available. Table 6.2 lists the commonly used definitions and agency source used by the oil and gas industry. No hydraulic fracturing projects were reported in the Rule 1148.2 database for all of Los Angeles County in the time period 2016 to July 2021. Most of the well report locations were in the cities of Long Beach, Los Angeles, and Wilmington as listed in Table 6-3.

Due to the small sample size of well activity in the unincorporated LA County area and to present a general idea of the types and amounts of chemicals used for well work activities in the Los Angeles basin, the data set presented in this section of the report is for the entire Los Angeles

County. Figures 6.1 through 6.3 map where these well activities occurred with unincorporated LA County shown in gray.

Table 6.1 2018 Rule 1148.2 Well Activity LA County

Rule 1148.2 Data 2016 through July 2021	
Well Activity Type	**Number**
Well Drilling	121
Matrix Acidizing	1
Hydraulic Fracturing	0
Gravel Packing	175
Maintenance Acidizing	747
Acid Fracturing	3
Other	2
Total	**1,049**

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Table 6.2 Well Activity Definitions

Type	Definition	Source
Acid Fracturing	A well stimulation treatment that, in whole or in part, includes the pressurized injection of acid into an underground geologic formation in order to fracture the formation, thereby causing or enhancing, for the purposes of this division, the production of oil or gas from a well.	SB4
Acid Matrix Stimulation	An acid treatment conducted at pressures lower than the applied pressure necessary to fracture the underground geologic formation.	SB4
Acidizing	A treatment of the wellbore or reservoir formation with an acid to either clean out scale, damage, or other debris in the well, or react with the soluble substances in the formation to improve permeability and enhance production of oil and gas	SCAQMD Rule 1148.2
Gravel Packing	A method that uses water and additives to place sand and gravel near the wellbore itself with the objective of limiting entry of formation sands and fine-grained material into the wellbore	
Hydraulic Fracturing	A technique used in stimulating a formation or zone that involves the pressurized injection of hydraulic fracturing fluid, which is a carrier fluid mixed with chemical additives, and typically a proppant, into an underground geologic formation in order to fracture the formation, thereby causing or enhancing the production of oil or gas from a well	SCAQMD Rule 1148.2
Maintenance Acidizing	Commonly used by industry to describe the use of acid for well bore de-scaling maintenance activities.	Oil and Gas Industry

Source: SB4 Well Stimulation Regulations, SCAQMD Rule 1148.2, oil and gas industry staff.

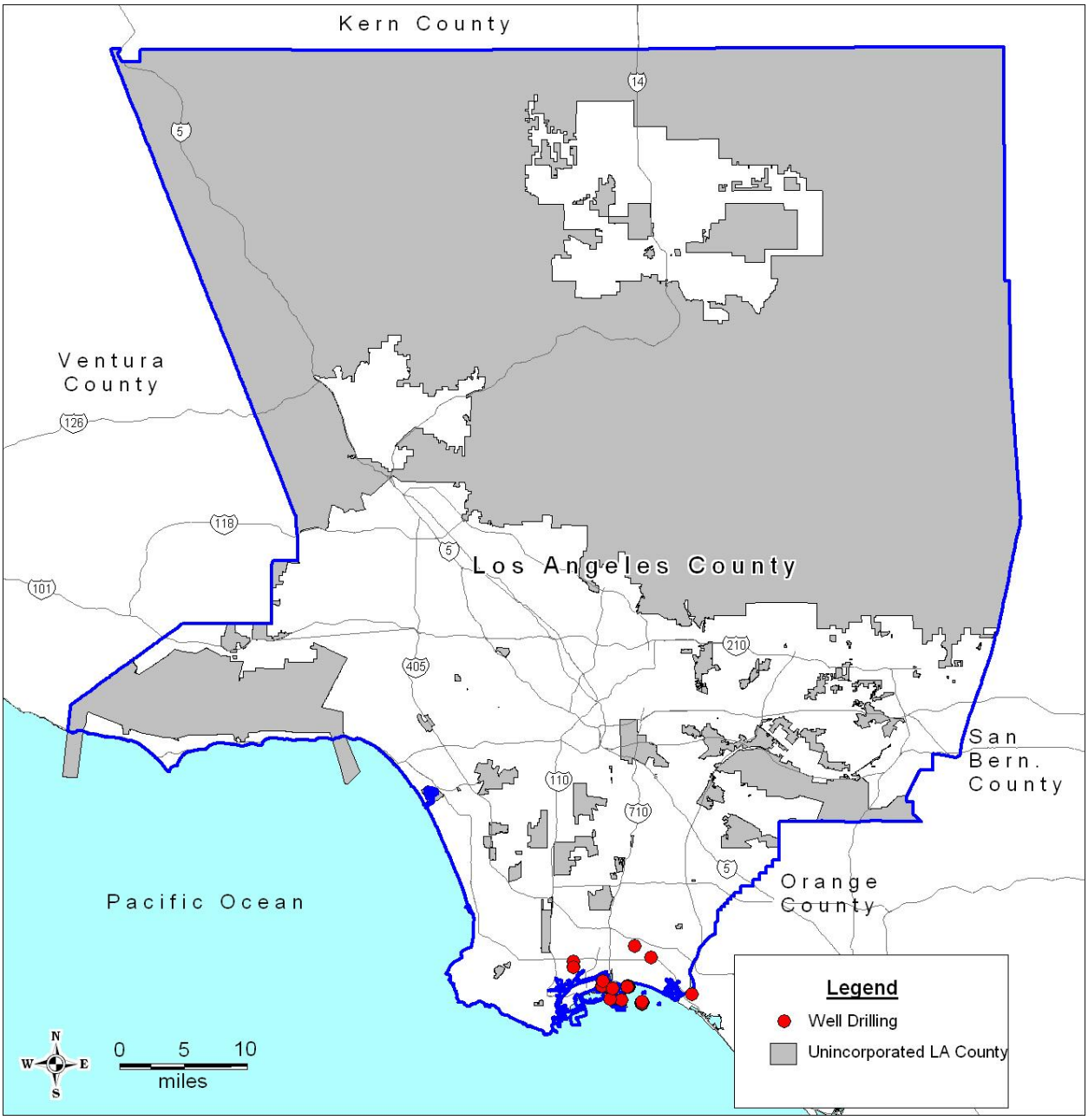
Table 6.3 Rule 1148.2 Well Drilling, Maintenance, and Workover Activities by City

Rule 1148.2 Data 2016 through July 2021	
City/Community	**Number of Well Activity Events**
Brea	5
Carson	8
Castaic	2
Fullerton	2
Harbor City	1
Huntington Beach	21
La Habra Heights	1
Long Beach	826
Los Angeles and Unincorporated Los Angeles	99
Montebello	3
None identified	6
Northridge	5
Santa Fe Springs	3
Seal Beach	1
Signal Hill	15
Valencia	1
West Los Angeles	1
Wilmington	49
Total	**1,049**

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

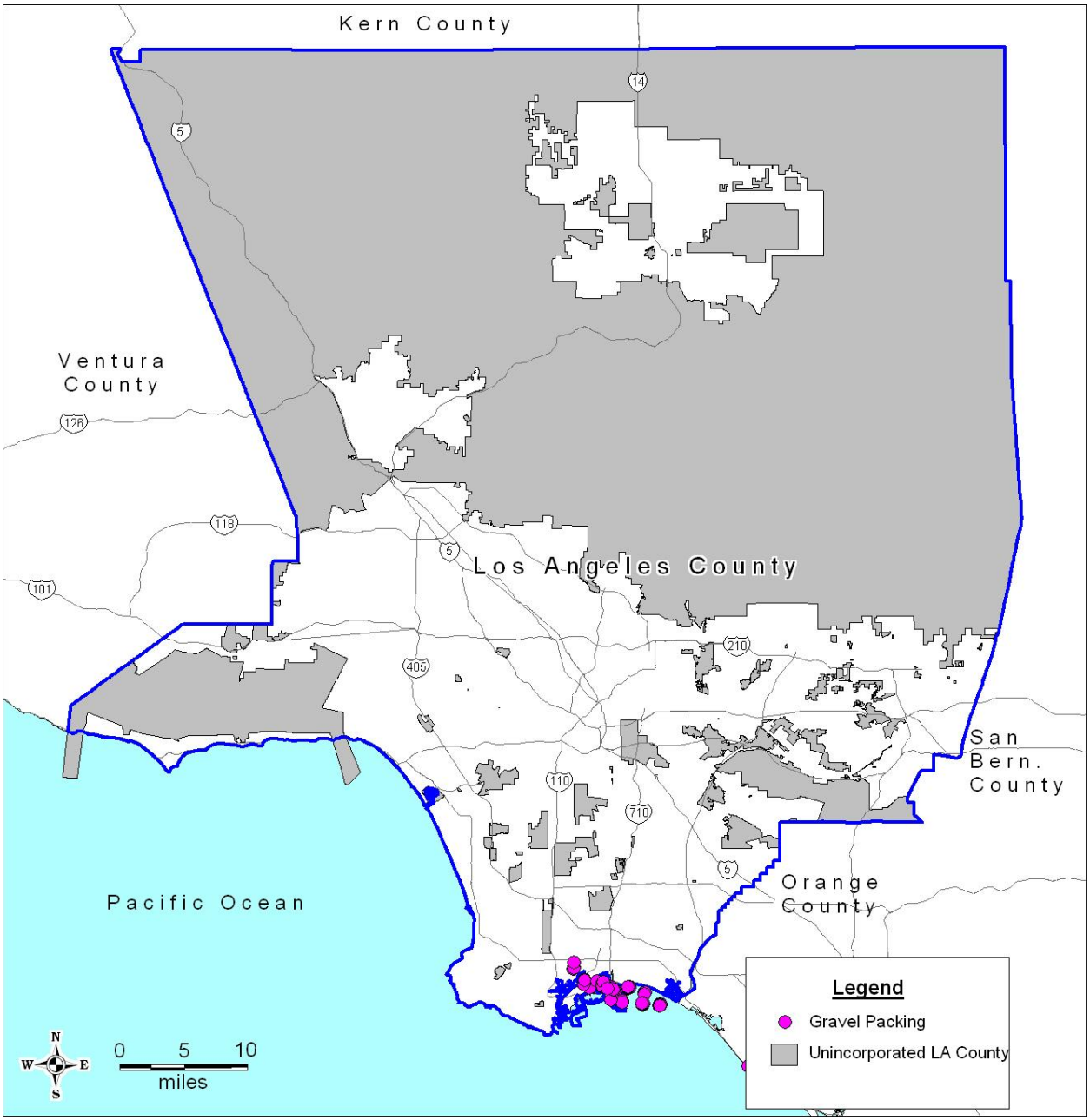
Figures 6-1 through 6-3 show the locations of the well activities listed in Table 6-1 above.

Figure 6-1 Rule 1148.2 Well Drilling Locations



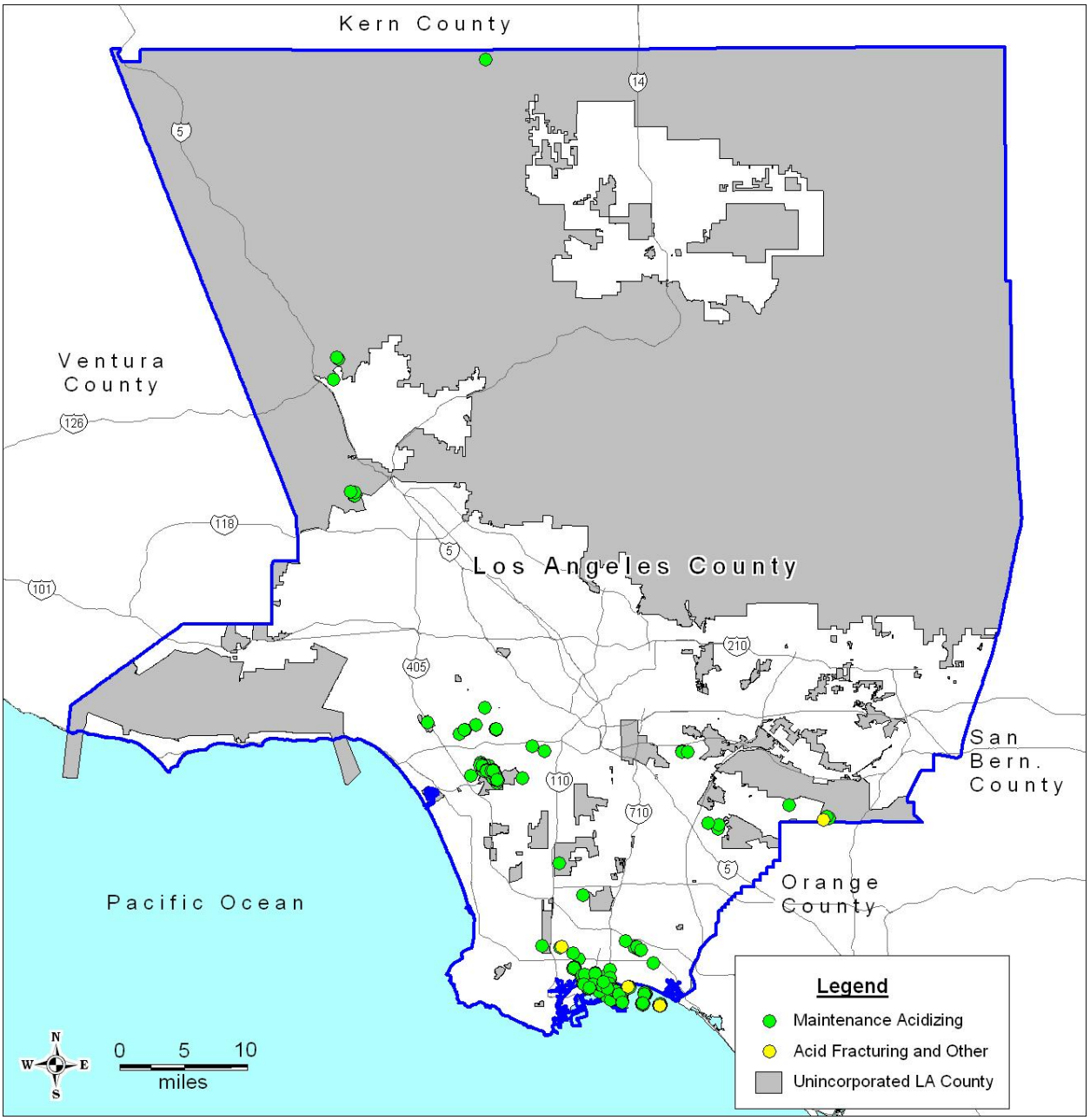
Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

Figure 6-2 Rule 1148.2 Gravel Packing Locations



Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

Figure 6-3 Rule 1148.2 Well Maintenance Acidizing, Acid Fracturing and Other Locations



Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

6.2 Well Fluid and Chemical Use

Rule 1148.2 provides quantities, total fluid, and chemical specific data for each product used in a well drilling fluid, well maintenance fluid, or well completion fluid. Table 6.4 lists the average fluid use for each well activity type reported for the 2016 through July 2021 time period. It is important to note the fluid use numbers include water and the Rule 1148.2 database reports total fluid use and does not break out individual types of materials by volumes of fluids.

Table 6.4 Rule 1148.2 Total Fluid Use by Well Activity

Rule 1148.2 Data 2016 through July 2021	
Well Activity Type	**Average Fluid Use Including Water (Gallons) per Well**
Well Drilling	60,848
Gravel Packing	11,249
Maintenance Acidizing	29,084
Acid Fracturing	16,256
Other	47,880

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Review of the chemical use for the well activities in the 2016 through July 2021 Rule 1148.2 data set lists 224 different chemicals. The Rule 1148.2 database includes chemical use calculated by mass, in pounds. It is important to note that the values shown indicate the amount of material or chemical used down hole for each well activity and do not represent calculations for materials released into the atmosphere. Tables 6.5 through 6.9 identify the top 25 materials and the average amount, in pounds, used for each well activity in the 2016 to July 2021 data set. As listed in Table 6.1 above, hydraulic fracturing was not conducted during the 2016 through July 2021 reporting period. Note for well activities with less than 25 different material use types, all materials use types are listed. Appendix B provides a complete list of all the material and chemical types with CAS numbers for Los Angeles County for the Rule 1148.2 data set years 2016 through July 2021.

Table 6.5 Rule 1148.2 Average Material Use by Well Activity- Well Drilling

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	108,606
PORTLAND CEMENT	65997151	16,261
POTASSIUM CHLORIDE	7447407	13,144
QUARTZ (SILICA)	14808607	12,792
BARITE	7727437	11,273
BARITE (BA(SO4))	13462867	4,165
CALCIUM CARBONATE	471341	3,014
CARBONIC ACID CALCIUM SALT (1:1)	471341	3,014
SODIUM CHLORIDE	7647145	2,522
SAPONITE	1319411	1,746
OIL, HYDRO LIGHT NAPH DIST	64742536	1,276
POLYANIONIC CELLULOSE	9004324	1,069

Table 6.5 Rule 1148.2 Average Material Use by Well Activity- Well Drilling

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
MICA-GROUP MINERALS	12001262	854
SODIUM CARBONATE	497198	533
GYPSUM	13397245	434
FUMED SILICA	69012642	400
AMORPHOUS SILICA	7631869	312
SODIUM BICARBONATE	144558	301
CELLULOSE	9004346	276
MAGNESIUM OXIDE	1309484	269
XANTHAN GUM	11138662	255
STEARIC ACID	57114	235
CALCIUM OXIDE	1305788	232
TALL OIL	8002264	227
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	217

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.
Chemical amount listed is average per well activity based on 121 well drilling jobs.
Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.6 Rule 1148.2 Average Material Use by Well Activity-Gravel Packing

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	244,125
BARITE	7727437	22,467
SULFURIC ACID, BARIUM SALT (1:1)	7727437	22,467
PORTLAND CEMENT	65997151	20,336
POTASSIUM CHLORIDE	7447407	20,273
QUARTZ (SILICA)	14808607	15,901
CALCIUM CHLORIDE	10043524	14,279
CALCIUM CARBONATE	471341	7,329
SODIUM CHLORIDE	7647145	4,937
GYPSUM	13397245	2,665
AMORPHOUS SILICA	7631869	1,859
SAPONITE	1319411	1,692
MAGNESIUM OXIDE	1309484	1,460
CALCIUM OXIDE	1305788	1,438
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	1,333
MICA-GROUP MINERALS	12001262	1,198
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	932
MAGNESIUM	7439954	823
FUMED SILICA	69012642	643
ALUMINUM OXIDE	1344281	565

Table 6.6 Rule 1148.2 Average Material Use by Well Activity-Gravel Packing

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
CARBONIC ACID SODIUM SALT (1:2)	497198	487
SODIUM CARBONATE	497198	487
SODIUM BICARBONATE	144558	406
DISODIUM METASILICATE	6834920	395
BENTONITE	1302789	343

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.
Chemical amount listed is average per well activity based on 175 gravel packing jobs.

Table 6.7 Rule 1148.2 Average Material Use by Well Activity-Maintenance Acidizing

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	135,326
HYDROCHLORIC ACID	7647010	2,921
HYDROGEN CHLORIDE	7647010	2,921
AMMONIUM CHLORIDE	12125029	1,067
XYLENE	1330207	662
SODIUM CHLORIDE	7647145	331
POTASSIUM CHLORIDE	7447407	306
ACETIC ACID	64197	275
HYDROFLUORIC ACID	7664393	265
CALCIUM CHLORIDE	10043524	261
ETHYLBENZENE	100414	190
2-HYDROXY-1,2,3-PROPANETRICARBOXYLIC ACID	77929	174
CITRIC ACID	77929	174
METHANOL	67561	128
PORTLAND CEMENT	65997151	85
2-BUTOXY ETHANOL	111762	80
ETHYLENE GLYCOL MONOBUTYL ETHER	111762	80
BARITE	7727437	73
BARITE , QUARTZ, CRYSTALLINE SILICA	14808607	57
QUARTZ (SILICA)	14808607	57
NONYLPHENOL ETHOXYLATE	127087870	48
AROMATIC PETROLEUM DISTILLATES	64742945	37
CITRUS TERPENES	94266474	35
CALCIUM CARBONATE	471341	30
BIOBASED TERPENE EXTRACTIVES	68956569	27

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.
Chemical amount listed is average per well activity based on 747 maintenance acidizing jobs.
Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.8 Rule 1148.2 Average Material Use by Well Activity-Acid Fracturing

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	410,916
BARITE	7727437	91,434
PORTLAND CEMENT	65997151	72,216
POTASSIUM CHLORIDE	7447407	43,619
CRYSTALLINE SILICA	14808607	18,248
SILICA, CRYSTALLINE, QUARTZ	14808607	9,760
GYPSUM	13397245	9,629
CALCIUM OXIDE	1305788	5,079
SAPONITE	1319411	4,917
MICA	12001262	4,872
AMORPHOUS SILICA FUME	69012642	4,818
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	4,814
MAGNESIUM OXIDE	1309484	4,814
SULFONATE	0	4,167
ANIONIC ACRYLAMIDE COPOLYMER	0	3,183
AMORPHOUS SILICA	7631869	2,985
HYDROCHLORIC ACID	7647010	2,761
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	2,500
SODIUM CHLORIDE	7647145	2,302
AMMONIUM CHLORIDE	12125029	1,810
ALUMINUM OXIDE	1344281	1,569
DISODIUM METASILICATE	6834920	1,555
LIGNITE	1415936	1,502
SODIUM CARBONATE	497198	1,217
BENTONITE	1302789	1,048

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.
Chemical amount listed is average per well activity based on 3 acid fracturing jobs.
Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.9 Rule 1148.2 Average Material Use by Well Activity-Other

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	44,250
BENTONITE	1302789	21,138
SULFURIC ACID, BARIUM SALT (1:1)	7727437	5,000
QUARTZ (SILICA)	14808607	3,598
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	875
ANIONIC POLYACRYLAMIDE	9003058	581
CARBONIC ACID SODIUM SALT (1:2)	497198	550

Table 6.9 Rule 1148.2 Average Material Use by Well Activity-Other

Rule 1148.2 Data 2016 through July 2021		
Chemical Name	CAS Number	Amount (Pounds)
SODIUM BICARBONATE	144558	543
XANTHAN GUM	11138662	500
OIL, HYDROTREATED LIGHT NAPTHENIC DISTILLATE	64742478	291
SODIUM POLYACRYLATE	9003047	123
COMPOUND SYNTHETIC DIESTERS	8029398	78
SULFURIC ACID, IRON(2+) SALT (1:1), MONOHYDRATE	17375416	18
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-ISODECYL-.OMEGA.-HYDROXY-, PHOSPHATE, POTASSIUM SALT	68071170	14

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.
Chemical amount listed is average per well activity based on 2 other category well jobs.
Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

6.3 Acute Materials

The SCAQMD Rule 1148.2 database materials used for the well drilling fluid, well maintenance fluid, or well completion fluid activities were reviewed for acute or explosive materials. Acutely toxic chemicals are those substances that pose significant adverse health effects for immediate or short-term exposures. The route of exposure that may cause adverse effects are inhalation, absorption (through skin, eyes, or mucous membranes), or ingestion, depending on the chemical. Chemicals such as hydrofluoric or hydrochloric acid become acutely toxic only at certain concentrations. Table 6.10 identifies the acute or explosive chemicals in the SCAQMD Rule 1148.2 data base in this report. Note that most materials in the SCAQMD database do not pose an acute health risk to the public.

Table 6.10 Rule 1148.2 Acute Materials

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Notes
Acute Materials		
FORMALDEHYDE	50000	(>37%) formaldehyde solution
ETHYLENE OXIDE	75218	Pure or gaseous form
PEROXYACETIC ACID	79210	(concentration > 60% Acetic Acid; also called Peracetic Acid)
HYDROCHLORIC ACID	7647010	Anhydrous
HYDROFLUORIC ACID	7664393	Anhydrous
AMMONIA	7664417	Ammonia solutions (> 44% ammonia by weight) or anhydrous
HYDROGEN PEROXIDE	7722841	(52% by weight or greater)
Explosive Materials		
ACETONE	67641	Pure form, flammable
TRIETHYLENE GLYCOL	112276	Pure form, flammable

Sources: SCAQMD Rule 1148.2 Chemical Reporting Database; Federal EPA and ATF listings, Title 8, Division 1, Chapter 4. Division of Industrial Safety Subchapter 7. General Industry Safety Orders Group 16. Control of Hazardous Substances Article 109. Hazardous Substances and Processes, Appendix A to Section 5189 - List of Acutely Hazardous Chemicals, Toxics and Reactives (Mandatory).
Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

6.4 Recommendations

As noted above, transportation of hazardous materials for the purpose of drilling oil and gas wells is not covered under the Fire Department requirements for HMBPs.

6.4.1 Transportation Risk Management and Prevention Program (TRMPP)

The Strike Team recommends adoption of a Transportation Risk Management and Prevention Program (TRMPP) to address the lack of regulations for the transportation of hazardous materials as noted above. The requirement would consist of the following:

If the transportation routes of any product from oil and gas development in the County passes through or adjacent to any sensitive zoning such as residential, excluding designated truck routes, the operator shall prepare and maintain a Transportation Risk Management and Prevention Program which shall be provided to the County upon request. The TRMPP may contain the following components including, but not limited to:

A. Provisions for conducting comprehensive audits of carriers biennially to assure satisfactory safety records, driver hiring practices, driver training programs, programs to control drug and alcohol abuse, safety incentive programs, satisfactory vehicle inspection and maintenance procedures, and emergency notification capabilities. The operator shall submit to the County any audits that were conducted each calendar year.

B. Provisions for allowing only carriers which receive a satisfactory rating under the above audit process to transport oil and gas.

C. Truck loading procedures for ensuring that the loading rack operator and the truck driver both conduct, and document in writing, a visual inspection of the truck before loading and procedures to specify actions to be taken when problems are found during the visual inspection.

7.0 Conclusion

This final report was completed pursuant to the Board's March 2016 Motion and September 2018 action and concludes the Strike Team's efforts pursuant to those directives. The research, data collection, database development, mapping, field inspections, and analysis in this report document the Strike Team's research and investigation of the following oil and gas elements:

- Abandoned and orphan wells;
- Storage facilities;
- Pipelines; and,
- Hazardous chemicals.

The analysis of the data in this report allowed for the development of the recommendations for public safety and environmental improvements to the regulations contained in this report. In addition, it is recommended that for all the proposed recommendations in this Report, the County departments involved have some follow-up coordination to determine how some of the recommendations in this Report will be implemented. The appropriate County agencies should reconvene to create an implementation plan for the recommendations provided.

The Strike Team acknowledges the assistance from the following agencies in completing the final report:

- South Coast Air Quality Management District;
- Regional Water Quality Control Board; and
- California Geologic Energy Management Division (CalGEM).

Appendix A

Strike Team Advisory Panel Phase II Input Summary

Appendix B

Community Health Safety and Notification Plan Marina Del Rey Well Abandonment

Appendix C

SCAQMD Rule 1148.2 Chemical List

Appendix D

Detailed High Priority Well Maps

Appendix E

Draft Abandoned/Idle Well Inspection Protocol

Appendix F

Well Inspection Sheets